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To Alecos and Danae for Always Being There For Me

“Apply yourself. Get all the education you can, but then, by God, do something. Don't just stand there, make it happen.”

Lee Iacocca

Abstract

This thesis illustrates that didactic and gnostic practices, identified through a structured Knowledge Transfer Framework, can effect business improvement in Small and Medium-sized Enterprises.

Small and Medium-sized Enterprises form a significant heterogeneous economic force. They strengthen the capacity of a country to generate employment and wealth for the general benefit of regional and national economies. The importance of SMEs in the prosperity of a society and their contribution to new job creation, coupled with the recognition that they seem to underperform, enhances the need to assist smaller companies improve their performance.

The author investigated the essence of Small and Medium Enterprises, conducted a literature review in Benchmarking and Self-Assessment principles and asserted the importance of knowledge in sustainable business development.

The author introduced the SME Knowledge Deficit, assessed its implications on business improvement, and elaborated that the Knowledge Deficit can be addressed through the establishment of a Knowledge Transfer Framework in the SME domain.

The thesis establishes the characteristics of a Knowledge Transfer Process for SMEs, leading to the development of a Knowledge Transfer Framework in the domain. This supports business improvement. The framework provides diagnostic assessment of business performance, task defined specific solutions embracing better practices and innovative advances through Win-Win Benchmarking. The analysis connects to business performance, and recalibrates Small and Medium-sized Enterprises towards better practices. Improved business performance is based on knowledge sourced from superior performing companies. This is shown to be effective despite the polyonymous and indiomorphous nature of their business environment.

The Knowledge Transfer Framework combines Self-Assessment and Benchmarking practices. It is implemented through Focus Group practices. This practical research was validated in a specially selected portfolio of Small and Medium-sized Enterprises in the United Kingdom. It draws upon practical application in Spain and Germany.

The author demonstrated that Knowledge Transfer can successfully occur amongst Small and Medium-sized Enterprises if approached through a structured methodology. The foundation of a grand Benchmarking database is not essential for Knowledge Transfer. Superior practices can be successfully sourced and disseminated via a structured Knowledge Transfer Framework and a portfolio of specially selected enterprises displaying superiority in a designated area of their business, rather than from global best practices.

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Special thanks go to Jorge Parra of the Instituto Aragones de Formento (Spain), Professor Heiderose Kilper of the Institut Arbeit und Technik (Germany) and Babette Schulz from Rationalisierungs Kuratorium der Deutschen Wirtschaft Hessen (Germany) for agreeing to adopt the proposed SME Knowledge Transfer Framework within their regions, providing an international dimension to the research.

Particular thanks go to all the colleagues and staff at the CIM Institute, Cranfield University, for the frequent informal discussions concerning research problems in the quest to understand the maze and complexity of Small and Medium Enterprises and Performance Assessment. A very special thanks goes to Alastair Johnson and Clare Wyatt for their valuable suggestions which added dimension of rigour to my work, and to Yvonne Booth for her devoted assistance and continuous encouragement.

I would also like to express my gratefulness to all the Small and Medium Enterprises, in the United Kingdom who responded so constructively to the Knowledge Transfer Framework and provided the practice sites for the research.

The list of acknowledgements would certainly be incomplete without acknowledging my deepest appreciation to my parents Alecos and Danae, for their invaluable encouragement and both emotional and financial support throughout all my academic years.

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Author Profile

Alexandros Skandalakis was born in Athens, Greece, in 1973. He graduated from "Lycee Leonin Franco-Héllènique" in 1991, a French private school based in Nea Smyrni, Attica.

Alexandros read his Bachelors degree at the University of Glasgow, United Kingdom, where he obtained a First Class Honours degree in Mechanical Engineering Computer Integration in July 1995. Alex holds the 1992 Lorimer Engineering Maths Award and the 1995 MECI Award from the University of Glasgow for outstanding performance in Engineering Mathematics and Mechanical Engineering respectively. In June 1997, Alexandros was awarded a Master of Science degree in Computer Integrated Manufacturing from Cranfield University, United Kingdom.

In conjunction with his studies, he undertook a number of industrial projects with leading enterprises such as IBM, British Aerospace and Rover, focusing on developing integrated tools to access and retrieve information held in diverse formats and locations over the Internet, fostering strategic exploitation of IT. The author's Masters thesis, sponsored by the ESPRIT "Intelligent Control and Integrated Manufacturing Systems" Network of Excellence (ICIMS-NOE), investigated the provision and capability of Academic institutions across Europe to develop advanced Manufacturing Engineers. His work provided the foundations for an Internet based Benchmarking tool for Universities and Academic Institutions which was submitted at the ICIMS-NOE directorate at the University of Patras, Greece.

Between 1997 and 1998, Alexandros worked as an agent for the United Kingdom in the "European Network for Advanced Performance Studies" (ENAPS) Project, a European Commission ESPRIT funded Project, concerned with Business Processes, Benchmarking and Performance Measurement in Small and Medium Manufacturing Enterprises, across eighteen European countries. During the same period, he enhanced his specialisation in Small Business Improvement through his leading role in the transnational activities of the "Co-Operation of Regions in Europe" (CORE) Project, a European Social Fund ADAPT Project aiming to improve the performance and sustainability of Small Enterprises in the United Kingdom, Germany and Spain. These projects proved to be an enchanting experience for the author.

Alexandros presented his research work at highly acclaimed national and international conferences in the United Kingdom, Germany, Spain, United States, Poland and Greece, and has been an invited lecturer for the Total Quality Management Programme at the University of Zaragoza with the Instituto Aragones de Formento in Spain. In addition, he organised and conducted Benchmarking workshops for Small and Medium-sized Enterprises in the United Kingdom and collaborated with SMEs in Greece, Germany and Spain.

The author is a member of three Professional Associations in the United Kingdom and Greece, and has been the president of the Hellenic Society in Cranfield University during 1996-1997. He also contributed to the foundation of Association of Hellenic Students in the United Kingdom, a community-supporting Greek Nationals studying in the UK. Alexandros is a keen traveller, an aviation enthusiast, enjoys gliding and going to the theatre and the opera.

Future perspectives include consolidating a respected position as a researcher, practitioner or consultant, employing his work to ameliorate the position of European Small and Medium-sized Enterprises.

Publications and Presentations

The following papers have been published related to this research:

1. Sackett P., Nelder G., Skandalakis A. (1996). "**Pilot Study into Developing Advanced Manufacturing Engineers for European Competitiveness**", European Commission ICIMS-NOE News, No 10, pp. 4-7, ISSN: 1107-9770.

2. Sackett P., Nelder G., Skandalakis A. (1997). "**Developing Advanced Manufacturing Engineers for European Competitiveness**", Proceedings of the American Society for Engineering Education Annual Conference, 15-18 June, Milwaukee, USA, paper number 326302ms.

3. Sackett P., Groumpos P., Skandalakis A. (1997). "**Advanced European Manufacturing Education for 2010 - Transitioning**", The Key Note Paper, Issues & Challenges of Manufacturing and Control Education for the 21st Century, SOCRATES Thematic Network Symposium, 26-28 June, University of Patras, Patras, Greece, pp. 20-30, ISBN: 960-530-019-2.

4. Skandalakis A., Nelder G. P., Lowenthal P. A., Maxwell D. J. (1997). "**Benchmarking European SMEs**", Proceedings of the 13th National Conference on Manufacturing Research, 9-11 September, Glasgow Caledonian University, Glasgow, United Kingdom, pp. 380-385, ISBN: 1-86058-172-2.

5. Nelder G. P., Skandalakis A., Martin V. (1998). "**Integrated Business Support for SMEs**", First International Stimulating Manufacturing Excellence in Small and Medium Enterprises Conference, 19-22 April, Sheffield, United Kingdom, pp. 207-212, ISBN: 1-85075-902-2.

6. Sackett P., Skandalakis A. (1998). "**Model Based Company Assessment for Intelligent Decision Support**", Advanced Summer Institute (ASI) 1998, The Annual Conference of the ICIMS – Network of Excellence, 14-17 June, Bremen, Germany, pp. 60-66, ISBN: 960-530-026-5.

7. Nelder G., Skandalakis A. (1998). **"Benchmarking Small and Medium-sized Manufacturing Enterprises"**, 14th National Conference on Manufacturing Research, 9-11 September, University of Derby, Derby, United Kingdom, pp. 499-504, ISBN: 1-9012-4811-9.

8. Skandalakis A., Nelder G., Evens L. (1998). **"An Approach to Management Learning and Business Development in Small and Medium Sized Enterprises"**, Innovation and Change: Providing Flexible Approaches to Management Learning Conference, 24-25 September, Bolton Institute, Bolton, United Kingdom, pp. 50-59, ISBN: 1-901-643-01-8.

9. Skandalakis A., Nelder G. (1998). **"A Structured Benchmarking Methodology Designed for Small and Medium-sized Enterprises"**, The European Best Practice Benchmarking Award Forum, 14-15 October, The International Arena, Cardiff, United Kingdom.

10. Skandalakis A., Nelder G. (1999) **"Stimulating Improvement Through Knowledge Transfer in Small and Medium-sized Enterprises"**, Second International Stimulating Manufacturing Excellence in Small and Medium Enterprises Conference, 29- 31 March, Plymouth, United Kingdom, ISBN: 1-84102-035-4.

11. Skandalakis A., Nelder G. P. (1999). **"Benchmarking as a Diagnostic Process to Increase the Competitiveness of Small and Medium-sized Manufacturing Enterprises"**, International Journal of Technology Management, Special issue on Competitive Manufacturing for Small and Medium Enterprises (awaiting publication).

12. Nelder G., Skandalakis A. (1999). **"Diagnostic Benchmarking for Small and Medium-sized Enterprises"**, The Journal of Short Communications in Manufacture and Design (awaiting publication).

13. Sackett P. J., Skandalakis A. (1999). **"Business Improvement through Knowledge Transfer: A Framework for Small and Medium-sized Enterprises"**, prepared for the IFIP International Enterprise Modelling Conference, 15-16 June, Verdal, Norway.

14. Skandalakis A., Sackett P. J. (1999). **"Establishing Knowledge Transfer in Small and Medium-sized Enterprises"**, prepared for the Advanced Summer Institute 1999, The Annual Conference of the ICIMS – Network of Excellence, 22-24 September, Leuven, Belgium.

The following presentations have been conducted regarding this research:

1. Skandalakis A., Nelder G. (1997). "**Globalisation of the Automotive Industry: Car Crashes for the Future**", Presentation at the ADAPT – CORE Transnational COMECO steering committee, Institut fur Arbeit und Technik, 12 September, Gelsenkirchen, Germany.

2. Skandalakis A. (1997). "**Experiences in Benchmarking Implementation**", The Benchmarking Workshop, Palacio de Congresos y Exposiciones de Albarracin, 27-28 October, Teruel, Spain.

3. Skandalakis A. (1997). "**Transnational Benchmarking and the CORE Benchmarking Model**", The Benchmarking Workshop, Palacio de Congresos y Exposiciones de Albarracin, 27-28 October, Teruel, Spain.

4. Skandalakis A. (1997). "**Business Excellence Benchmarking and CORE**", Presentation for the Red Espanola de Ciudades del Automovil "RECA" (Spain) and Motor Industry Local Authority Network "MILAN" (United Kingdom) representatives, 26 November, The CIM Institute, Cranfield University, United Kingdom.

5. Skandalakis A., Nelder G. (1998). "**Benchmarking: An Introduction to an Internet Business Development Tool Based upon the EFQM Quality Model**", Manufacturing Into the 21st Century ADAPT Conference, 4th February, Waterton Technology Centre, Bridgend, South Wales, United Kingdom.

6. Skandalakis A. (1998). "**Transnational Benchmarking**", Poster Presentation, The Route to Success, Benchmarking Conference, 10 February, The Marriott Hotel, Gateshead, United Kingdom.

7. Skandalakis A. (1998). "**ADAPT-CORE Benchmarking for Small and Medium Sized Enterprises**", ADAPT for Employability, The ADAPT National Conference and Exhibition, 24-25 February, Edgbaston, Birmingham, United Kingdom.

8. Sackett P.J., Skandalakis A. (1998). "**Benchmarking for the Future: The Cranfield European Network Perspective**", Best Practice Symposium and Practitioner Workshop, 31 March and 1 April, British Aerospace, Farnborough, United Kingdom.

9. Skandalakis A. (1998). "**Benchmarking for Small and Medium Sized Enterprises**", Poster Presentation, International Symposium on Distributed Enterprise, Intelligent Automation and Industrial Benchmarking, Putting Information and Communication Technologies into Practice, 23-24 April, Wroclaw, Poland.

10. Skandalakis A. (1998). "**Successfully Marking the Bench: The CORE Model**", European Workforce Development Conference: Making the most of all Employees, 11-13 May, East Midlands Conference Centre, Nottingham, United Kingdom.

11. Skandalakis A. (1998). "**Principles of Benchmarking**", Presentation for the Total Quality Management Programme, 29 May, University of Zaragoza and the Instituto Aragones de Formento, Zaragoza, Spain.

12. Skandalakis A. (1998). "**Internet Based Tool for Transnational Benchmarking**", Presentation for the New Forms of Work Organisation European Social Fund and ADAPT Thematic Event, 24 September, Birmingham, United Kingdom.

13. Skandalakis A. (1998). "**Transnational Co-operation: The Journey, The Output, The Future**", CORE – A Partnership Approach to Business Development: A Transnational Dissemination Conference, 29 October, Cranfield University, Cranfield, United Kingdom.

14. Nelder G., Skandalakis A. (1999). "**Innovation and Technology Transfer Strategy**", East of England Innovation and Technology Strategy Definition Workshop, Nissan European Technology Centre, Cranfield Technology Park, 20-21 January, United Kingdom.

The following workshops and seminars have been conducted regarding this research:

1. Skandalakis A. (1997). "**Benchmarking Seminar**", Half-Day Seminar for Small and Medium Manufacturing Enterprises, 16 October, The CIM Institute, Cranfield University, United Kingdom.

2. Skandalakis A. (1998). "**Benchmarking Seminar**", Common Interest Group Seminar for Small and Medium Manufacturing Enterprises, 25 March, The CIM Institute, Cranfield University, United Kingdom.

3. Skandalakis A. (1998). "**CORE Benchmarking Workshop**", Half-Day Workshop for Small and Medium Manufacturing Enterprises, 16 June, The CIM Institute, Cranfield University, United Kingdom.

The following papers are in preparation regarding this research:

1. Skandalakis A., Nelder G., Lytton S., Arnold T. (1999). "**Employee Motivation in Small Enterprises: The Janorhurst Experience**", prepared for the Engineering Management Journal.

2. Skandalakis A., Sackett P. J. (1999). "**A Knowledge Transfer Mechanism for Small and Medium-sized Enterprises**", prepared for the journal of Benchmarking for Quality Management and Technology.

3. Sackett P. J., Skandalakis A. (2000). **"Knowledge Transfer for Performance Improvement"**, prepared for the Performance Measurement - Past, Present and Future Conference, 19-21 July, Robinson College, Cambridge, United Kingdom.

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Chapter 1: Introduction

1.1 Synopsis

This Chapter presents the background to the research area, introduces the research problem, establishes the research objectives and lists the deliverables from the research. It ascertains the research novelty, addresses the contribution to knowledge, and outlines the structure of the thesis.

1.2 Small and Medium Enterprises

Small and Medium sized Enterprises, defined as enterprises that employ less than 250 employees and display an annual turnover less than 40 million ECU, are of significant importance for the micro and macro economic development of all nations. A report presented by the European Commission for the Madrid Council, concluded that SMEs constitute 99.8% of all companies, provide 66% of total employment and attain 65% of business turnover in the European Union (EC 1995). The report emphasises that enterprises with fewer than 100 employees have been responsible for almost all the job creation within the European Union in the past year. The importance of smaller companies is also reflected by Levy, who concluded that Small and Medium Enterprises contribute one third of the United Kingdom manufacturing output, employ 45% of the UK manufacturing workforce and constitute 99% of all UK manufacturing companies (Levy 1993).

The Confederation of British Industry notes that United Kingdom based manufacturing companies provide a total of around £100 billion added value per annum and of this, almost sixty percent is contributed by Small and Medium Enterprises (CBI 1995).

Small and Medium-sized Enterprises in all economies have been identified as primary agents for job creation. They strengthen the capacity of a country to generate employment and wealth for the general benefit of regional and national economies. They are highly important in the promotion of national and regional economic development. However, almost 50% of these companies cease operation within five years of their creation, which raises concerns that they consistently under-perform and so are ill prepared for future challenges (EC 1995).

A study carried out by the CIM Institute, Cranfield University, commissioned by the Department of Trade and Industry and the Engineering and Physical Sciences Research Council found that Small and Medium Sized Enterprises have little interest in preparing for the future through education and training (Sackett and Nelder 1995). The study found that SMEs have poor managerial and technical personnel resources. Small companies suffer from a drain of experienced personnel. They are more likely to lose staff to larger companies than they are to gain. The shortage of highly skilled people moving in to the sector isolates SMEs from an important source of knowledge and technology transfer. Further, the movement of people out of SMEs reduces the incentive to train.

The survey found that SMEs prefer to invest in capital equipment rather than training and organisational change (Sackett and Nelder 1995). This reduces the impetus for improvement. Business leaders with training and experience are much more open to new ideas, are confident that they can use new ideas and will seek ideas both within and outside the enterprise (Sackett and Nelder 1995). Seen against this background, the finding that 20% of Managing Directors questioned, in a sample of 900, had received no formal management education and no previous management experience before taking up their post is not surprising. The majority claimed on-the-job experience and some education, but no recent education.

Businesses managed by trained leaders have better than average rates of survival and growth, and are better equipped for the future (Sackett and Nelder 1995). Making this transition requires a holistic business development approach. Senior personnel are often resistant to academic approaches to education and training, where the individual is exposed, but are more receptive to learning opportunities presented as business development drawing on the experiential knowledge of their peer groups.

SMEs experience a scarcity of new knowledge, and require a process to assist enterprise evolution, knowledge acquisition and management learning for the future. Smaller companies often fail to maintain coherence between continuous improvement and day-to-day management, due to Knowledge Deficit, which can imperil their sustainability and long term endurance in the business arena.

The SME Knowledge Deficit can be characterised as: the difficulty that SME managers experience in identifying and prioritising what area of their business to improve, the unawareness of what performance standard they must attain, their bewilderment of where and how to acquire and find superior practices, supplemented by the difficulty in using and applying superior practices internally, and it is described in Chapter 5.

Lack of Knowledge reduces the impetus and capability for business development and improvement. Assisting Small and Medium-sized Enterprises to overcome the

knowledge barrier could have a significant effect on business improvement and might lead to long term sustainability and economic development.

1.3 Benchmarking

Michael Porter, in his book "Competitive Advantage" stated that a company gains a competitive advantage by performing its strategic activities cheaper and better than its competitors (Porter 1985). As technology, customer expectations and competitive responses continue to change at an increasing rate, companies that learn the fastest have a competitive advantage (Crom 1995). Companies must be engaged in continuous improvement mode to ensure their products and services remain competitive.

Karlof and Ostblom describe the objective of Benchmarking through a proactive statement: "to create value which is greater than the cost of creating it" (Karlof and Ostblom 1993). Organisations can add value to their business and distinguish themselves from their competitors through Benchmarking (Cook 1995). The essential message is that Benchmarking is a proactive process with its objective being to improve business performance.

Benchmarking can be used to assess and measure the strategic business processes, practices and services against competitors or best practices to indicate a shortfall in performance. It enables companies to acquire a better understanding of their strengths and weaknesses, and consequently to develop action plans and specify targets which can lead to superior or best practice performance. In general, it is an instrument for improvement by providing a reference point (Riis 1995(b)).

Benchmarking provides recognition that profitability and growth come from a clear understanding of how the business is doing, not just against its own performance in the previous year, but against the best you can measure (DTI 1995). The gaps in performance between the best companies and the "also-rans" can be vast: manufacturing industry leaders typically generate products up to two and a half times faster than the industry average and at half the cost (Economist 1991).

Potentially SMEs have the most to gain from both internal and external Benchmarking considering that the analysis of the performance gap normally keeps a company competitive (Monkhouse 1995; Balm 1996). Companies that participate in Benchmarking studies, position their performance against the best performing enterprises, either in the same or divers industrial sectors, attain diagnostic information concerning their operation mode, and hence improve through the adoption of best practices.

However, Small and Medium-sized Enterprises do not seem to engage in Benchmarking activities. An extensive and in-depth survey conducted by the CIM Institute demonstrated that only 32% of the participant companies benchmarked, and that the majority benchmarked against similar products or services (Dunn, Irgens et al. 1996). Small and Medium-sized manufacturing enterprises can be left behind, operating in the

same way and designing similar products as they always have. SMEs are typically deterred by what they perceive to be a considerable effort involved (Dale 1996). Often not enough time and the limited financial, personnel and time resources are the barriers to the implementation of Benchmarking in Small and Medium-sized Enterprises. These issues are further elaborated in Chapter 4.

1.4 Knowledge Transfer

In today's economy, knowledge is money, leverage, learning, flexibility, power, and competitive advantage. Knowledge is more relevant to sustained business than capital, labour or land. It has become the most crucial component in the struggle for competitiveness.

The author believes that knowledge for business benefit can be characterised as focused innovation which can be sourced from pooled expertise (data, information or existent knowledge). Knowledge is the full utilisation of information and data, coupled with the potential of peoples skills, competencies, ideas, intuitions, commitments and motivations. The generation of knowledge enables an organisation to go through a process of organisational self-renewal and to expand its boundaries (Richter and Vettel 1995).

The motives for the formation of inter-enterprise alliances for Knowledge Transfer include the need to spread the costs and risks of innovation (Mowery, Oxley et al. 1996). Through sharing of better practices, enterprises can obtain the knowledge that leads to superior performance in other enterprises. Better practice sharing decreases the learning curve for intra-firm improvement activities, imposing less strain on the financial and labour resources. Another potential motive and benefit from the formation of knowledge sharing ventures is the fostering of relationships with other enterprises (Appleyard 1996). Knowledge sharing can be employed by enterprises as a testing ground for more extensive co-operation such as the establishment of strategic alliances or joint ventures.

One of the most widely cited motives for collaboration, linked to the need of obtaining innovative knowledge, is the acquisition of new skills (technical and managerial) from partner firms (Mowery, Oxley et al. 1996). Companies collaborate to exchange knowledge and learn from each other. This is common in the establishment of strategic alliances and joint ventures where, enterprises are in reciprocal competitive relation of knowledge growth, to extract knowledge from their counterpart, to internalise it and develop their own competitive base (Richter and Vettel 1995). Consequently, Knowledge Transfer involves co-operation between participant enterprises.

Control frameworks for the Knowledge Transfer process are of prime importance. Given the different way in which knowledge and skills are formed, organised and utilised in different societal settings and its degree of implicitness, the ease of transfer may differ. Incompatibility in the knowledge structures and work systems between partner firms can generate many conflicts and difficulties in joint work. The different

degree of tacitness of knowledge can also cause asymmetry in Knowledge Transfer (Lam 1997). Therefore, a high level of planning and control system, combined with a well organised communication system, is required to be in place to assist the conversion of tacit (implicit) to explicit knowledge.

Through the research, the author demonstrates that enhanced Knowledge Transfer through the application of Benchmarking could tackle the SME Knowledge Deficit.

1.5 Research Novelty

In the literature, the focus of Benchmarking is as a performance-positioning methodology for companies. "Benchlearning", defined by Karlof and Ostblom as a process of learning through a Benchmarking study, is a resource intensive process and prohibitive for smaller companies (Karlof and Ostblom 1993). The author reviewed the principal Benchmarking initiatives available to Small and Medium-sized Enterprises in the United Kingdom and identified that they offer little information on how superior performances were achieved by the leading performers. There is a need for a Benchmarking process for Small and Medium-sized Enterprises that will provide not only diagnostic assessment of the participant enterprises, but also activity based specific solutions on how they can improve their performance.

Enterprises engaging in a Benchmarking study learn from and compare their practices against enterprises displaying best practices at a sectoral, regional, national or international level (Keegan 1998). Enterprises that are employed as best practice case studies in a specific business process usually acquire limited benefits from other participant enterprises in the same study. An unequal information flow can normally be observed which disadvantages the better enterprises. There is a need to establish a Benchmarking practice that will lead to bi-directional information flow, where both the enterprise displaying the best practice and the under-performer enterprise can secure benefits.

The author considered that it may be possible to implement a Knowledge Transfer process, based on self-assessment and Benchmarking principles, involving a process of measuring and comparing an organisations performance against superior performance, in similar or disparate industrial sectors, to gain knowledge on how premium performance can be attained. The process would need to be designed to comply with the needs of SMEs for a Benchmarking approach that enhances the competitiveness of the micro level companies, and would need to involve bi-directional information flow. The author believes that this is a novel area of research.

1.6 Research Domain

The aim of the research is to develop, implement and evaluate an advanced framework to enable Knowledge Transfer amongst Small and Medium-sized Enterprises. The framework sources knowledge-based potential within superior performing enterprises to enhance the competitiveness of under-performing companies, aiming to reduce the SME Knowledge Deficit.

The Knowledge Transfer Framework is based on Benchmarking and Self-Assessment principles, and is designed to comply with the nature of Small sized Manufacturing Enterprises. The nature of the research is practical and involves the fields of Benchmarking principles, Self-Assessment, Enterprise Assessment models, Knowledge Transfer and Small and Medium-sized Enterprises.

Small and Medium-sized Enterprises can be classified in the use of the Product Complexity and Uncertainty Matrix (Puttick 1986). Complexity is the means of measuring a large number of both physical product items and product process knowledge entities that must be managed in even the smallest manufacturing business. Uncertainty arises from the unpredictable behaviour of the market place. Sustainable business needs to move towards high Complexity and high Uncertainty (Sackett 1996). High Complexity / high Uncertainty products are information resource intensive and require an error-free business operation.

The author selected to apply the research in the fields of Small Manufacturing Enterprises that operate under the high Complexity and high Uncertainty typology, considering that enterprises operating under this typology are under higher jeopardy than enterprises under other typologies.

1.7 Research Objectives

In the context of Small Enterprises the research objectives are defined as being to:

- Review and Evaluate Benchmarking principles, self-assessment models and current Benchmarking practices
- Identify and understand the issues Small sized Enterprises face when they engage in a Benchmarking process
- Establish the requirements for the successful application of Knowledge Transfer
- Develop a Knowledge Transfer Framework to help these discrete Small sized companies to learn from better practices
- Evaluate the Knowledge Transfer implementation framework in selected companies to illustrate its valid application envelope.

1.8 Deliverables

The research reported in this thesis has resulted in the following deliverables:

- A requirements map for successful Knowledge Transfer
- A validated Framework to help small companies transfer knowledge from Better Practices
- A mapping mechanism for comparison of Benchmarking initiatives
- Identification process for Win-Win Benchmarking partner selection.

1.9 Contribution to Knowledge

The main contribution of the research lies in the development of a new methodology for Knowledge Transfer within Small sized Enterprises based on Benchmarking and self-assessment principles. The author believes that the new Knowledge Transfer Framework will extend both the functionality and ease of use of Benchmarking practices for knowledge sharing and business improvement.

The initial research led the author to the view that there was significant intellectual challenge and novelty in positioning a form of Benchmarking as a credible and feasible technique for Knowledge Transfer in the Small Enterprise environment. Exciting opportunities for business benefit were envisaged through widespread appropriate use of such a technique.

Application experiences in Small and Medium-sized Enterprises in the region of Bedfordshire have confirmed the promise of the new Knowledge Transfer Framework developed in this work. These are presented in Chapter 7.

1.10 Thesis Structure

The thesis is structured into nine Chapters, as described in Table 1:

Chapter	Title
Chapter 1:	Introduction
Chapter 2:	Research Methodology
Chapter 3:	Benchmarking Fundamentals
Chapter 4:	Benchmarking and Small and Medium-sized Enterprises

Chapter 5:	Knowledge Transfer
Chapter 6:	The Knowledge Transfer Framework
Chapter 7:	Implementation
Chapter 8:	Elaboration
Chapter 9:	Conclusion

Table 1: Thesis Structure

The contents of each Chapter are outlined below:

Chapter 1 provides background information to the research, introduces the research problem, establishes the objectives and lists the deliverables of the research. It establishes the programme boundaries and ascertains the contribution to knowledge. The structure of the thesis is presented.

Chapter 2 describes the research methodology, data collection, and data analysis process selected for the research. The Chapter explains the reasons for their selection, their advantages and disadvantages, and how they were employed.

Chapter 3 examines the basic principles of Benchmarking as a business improvement process. An extensive literature review of the definition, the different classifications, the advantages and limitations, and steps of a Benchmarking process are detailed. Self-assessment is examined as a Performance Measurement process and five major excellence assessment awards are detailed. The purpose of this Chapter is to provide background information concerning Benchmarking principles.

Chapter 4 considers the essence and nature of Small and Medium Enterprises, stresses their importance and reviews the application of Benchmarking in SMEs indicating the obstacles encountered. Current Benchmarking initiatives and practices are assessed, verifying that Benchmarking is predominantly employed as a performance-positioning tool, instead of a performance improvement and Knowledge Transfer methodology.

Chapter 5 presents the basic principles relating to Knowledge Transfer and outlines the essential characteristics of a Knowledge Transfer Process between Small and Medium Enterprises.

Chapter 6 describes and presents the features of a proposed systematic framework to support Knowledge Transfer between Small and Medium Enterprises. The features of the framework are described.

Chapter 7 outlines the series of events carried out to evaluate the Knowledge Transfer Framework in companies. The results from using and evaluating the implementation framework are presented.

Chapter 8 This Chapter outlines the research objectives, the methodology followed, and the research outcome. It discusses the research findings, experiences and observations following the implementation of the Knowledge Transfer Framework. The framework is compared against similar practices in the field to position its application against other applications of similar nature. Key learning points are extracted, and limitations of the work are discussed.

Chapter 9 provides an overview of the research, summarises the novelty of the work and outlines areas for future work following the research.

1.11 Conclusive Remarks

The majority of Small and Medium Enterprises have poor financial, managerial and technical personnel resources, and experience a scarcity of knowledge which acts as a barrier to business improvement and improve survival prospects. The author believes that techniques to improve these companies can offer enormous leverage for economic development.

This research proposes establishing an innovative Knowledge Transfer Framework for Small and Medium Enterprises through the application of Benchmarking practices. This Chapter established the research problem, outlined the research boundaries, stated the objectives and the deliverables of the research, and concluded with an overview of the structure of the thesis.

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Chapter 2: Research Methodology

2.1 Synopsis

This Chapter describes the research approach chosen, outlines the data collection methodology followed and describes the data analysis process employed. The Chapter demonstrates the research path chosen and describes the supporting reasoning.

Emphasis is placed on how the author seeks to explore this new subject by exploratory and descriptive research, and develop new knowledge through the application of grounded theory validated through Focus Groups.

2.2 Research Approach

Business research can be classified as being based on either technique or function. Experiments, surveys and observation studies are common research techniques. Classifying the research objectives based on the function (purpose) provides the link between the nature of the problem and the choice of the research method. The nature of the problem determines whether the research is exploratory, descriptive or causal (explanatory) (Zikmund 1997).

2.2.1 Overview

The research methodology has been split into five phases, in accordance with the nature of the research objectives outlined in section 1.7. Table 2 demonstrates the type of the research followed and the nature of the data collection process followed, to accomplish each of the objectives.

Research Objective	Research Type	Nature of Data
Review and Evaluate Benchmarking principles, self-assessment models and current Benchmarking practices	Exploratory	Qualitative Quantitative
Identify and understand the issues these company types face when they engage in a Benchmarking process	Descriptive	Qualitative Quantitative
Establish the requirements for the successful application of Knowledge Transfer	Grounded Theory	
Develop a Knowledge Transfer Framework to help these discrete Small sized companies to learn from better practices	Grounded Theory	
Evaluate the Knowledge Transfer implementation framework in selected companies to illustrate its valid application envelope.	Explanatory Focus Groups	Qualitative Quantitative

Table 2 : Research Approach Overview

The initial phase of this research was an exploratory activity, involving data gathering to provide the basis for the research theory building. The research type followed at this stage was exploratory research. Background information concerning Benchmarking principles and self-assessment methodologies were acquired. Both qualitative and quantitative methods were employed in the process. The results of this activity are detailed in Chapter 3. The research problem is not defined at this stage, as exploratory research is conducted with the expectation that subsequent research will be required to produce conclusive evidence (Zikmund 1997).

The second stage of the research provides a diagnostic analysis of the application of Benchmarking in Small and Medium-sized Enterprises. Descriptive research aims to determine the answers to who, what, where, when and how questions, and provide accurate information. Descriptive studies are based on some previous understanding of the nature of the research problem, which is provided by the explanatory research (Zikmund 1997). The descriptive analysis was based on both quantitative and qualitative data collection, and is described in Chapter 4.

The second stage provided the baseline for the generation of a list of requirements for the successful application of Knowledge Transfer in Small Enterprises, based on Benchmarking practices. This was achieved through grounded theory as the developed framework was based on explanatory and descriptive survey. The formal definition of the research problem lead to the fourth stage of the research, involving the conception and development of a methodology framework for Knowledge Transfer between Small Enterprises. Grounded theory was applied at this stage, through the use of both

qualitative and quantitative data collection methods. The development and the realisation of the framework are presented in Chapters 5 and 6 respectively.

The main research question at the final research stages was to verify if the proposed Knowledge Transfer Framework could have a significant effect on the improvement of Small and Medium Enterprises. The research type followed in this stage was exploratory as it provided an explanatory validation of the framework. The research was conducted through the development of Focus Group interviews amongst Small and Medium-sized Enterprises and was based on both qualitative and quantitative data, described in Chapter 7.

2.2.2 Exploratory Research

Exploratory research is the initial examination conducted to clarify and define the nature of the research problem. The main purpose is to obtain a better understanding of the dimensions of the problem through exploration (Zikmund 1997). Subsequent research is required to clearly define the research problem. The exploratory research involved an extensive review of the literature.

The exploratory search was conducted in the fields of *Benchmarking*, by providing a critical analysis concerning:

- A historical review of Benchmarking
- The definition Benchmarking
- The purpose of Benchmarking
- The Benchmarking types
- The steps in a Benchmarking process
- The pitfalls of Benchmarking and
- The link between Benchmarking, TQM and Performance Measurement.

A literature search was conducted on enterprise *Performance Assessment* practices, and more specifically on self-assessment. Information was sought on the definition, purpose, methodology and use of self-assessment. Although Performance Measurement theory was outside the scope of this thesis, information was sought on the most widely employed enterprise *Performance Assessment Models*. Literature was found on:

- The Deming Prize Model
- The Malcolm Baldrige National Quality Award Model
- The European Foundation for Quality Management (EFQM) Business Excellence Model (BEM).

Regular searching in the library and on-line databases, current and back issues of key journals, magazines and publications were scanned for interesting and relevant papers and articles in the above areas. The exploratory research was used to provide a general understanding of the research topic and formed the first part of the literature review. Chapter 3 describes the analysis of the exploratory research.

2.2.3 Descriptive Research

The purpose of descriptive research is to "describe the characteristics of a population or phenomenon" (Zikmund 1997). Unlike exploratory research, descriptive studies are based on some previous understanding of the nature of the research problem area (Robson 1993). To establish the research problem, the application of Benchmarking in Small and Medium Enterprises was investigated. The research:

- Identified obstacles for the implementation of Benchmarking Practices in Small and Medium-sized Enterprises
- Reviewed current Benchmarking initiatives aimed for SMEs
- Presented the problem of sourcing knowledge from better performing companies.

The descriptive research, in conjunction with the explanatory research mentioned in section 2.2.2, form the basis of the literature review, established the research problem and set the specifications for the Knowledge Transfer Framework. The outcome from the descriptive research is presented in Chapter 4.

2.2.4 Explanatory Research

Explanatory research takes an established situation and explains it. It seeks an explanation usually in the form of causal relationships (Robson 1993). In this case, the situation forms the application of the proposed framework, and its effectiveness is researched through the establishment and employment of Focus Groups. This stage entailed gathering qualitative and quantitative data from Small and Medium-sized Enterprises.

2.2.5 Grounded Theory

Grounded theory is inductively derived from the study of the phenomenon it represents. It is a qualitative research method that uses a systematic set of procedures to develop an inductively derived grounded theory about a phenomenon (Strauss and Corbin 1990). The purpose of the grounded theory is the "discovery of theory from data"(Bryman and Burgess 1994).

Grounded theory was presented initially by Glaser and Strauss in the book: "Discovery of Grounded Theory" (Glaser and Strauss 1967). The aim was to develop the baseline for theory developed through research, hence the definition "grounded theory", and to establish its linkage to qualitative research. According to Strauss, the book legitimised careful qualitative research, as by the 1960s it had attained a low status because it was not believed capable of adequate verification (Strauss and Corbin 1994).

Grounded theory works by collecting data, generalising findings into statements about the possible relationships involved and checking out these statements by further data collection to a point at which one can generalise about the findings of the research (Jankowicz 1995).

The basis grounded theory can be summarised in three stages (Becker and Geer 1982), Figure 1.

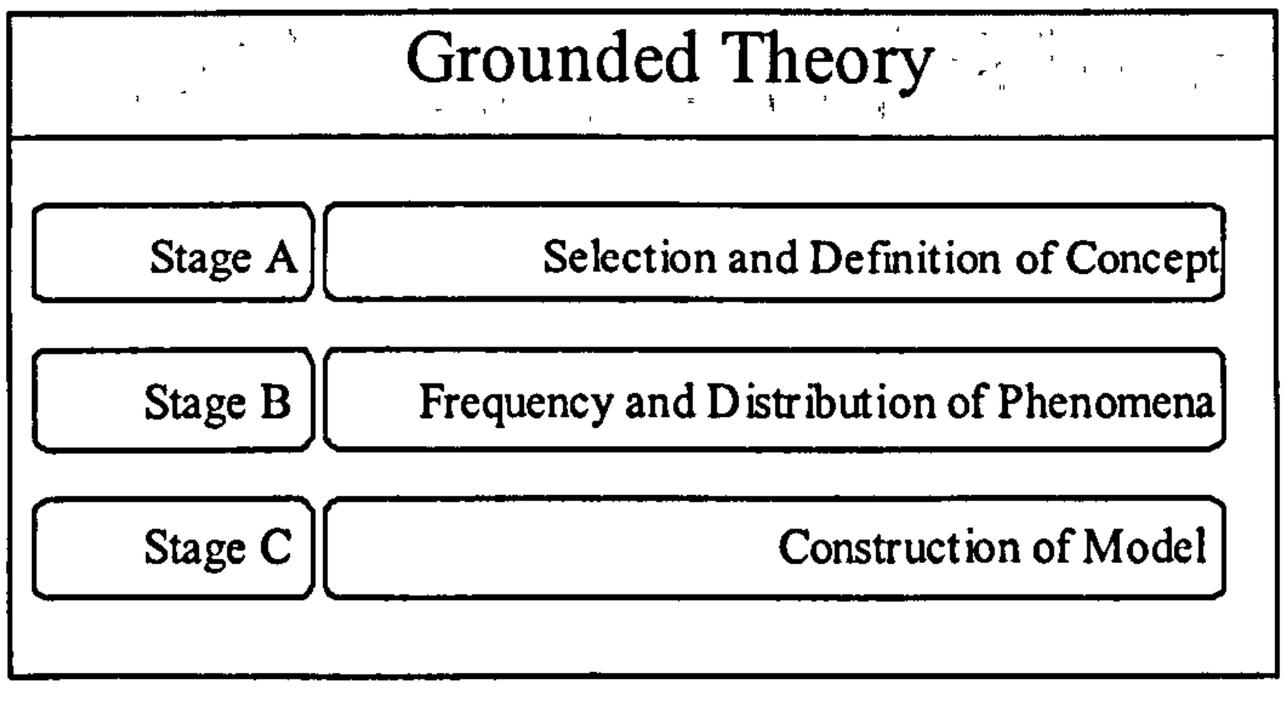

Figure 1: Grounded Theory

The Knowledge Transfer Framework was developed based on grounded theory. The exploratory and descriptive stages of the research led to the construction of the framework, which provides the general setting within which the research observations are described.

The selection and the definition of the concept was done at the explanatory stage, where the basics of Benchmarking principles were researched. The frequency and the distribution of the phenomenon was conducted at the descriptive phase, where the application of Benchmarking in Small and Medium companies was investigated. Finally, the construction of the model involved the development of the framework for Knowledge Transfer employing Benchmarking practices.

The framework was tested using Focus Groups.

2.2.6 Focus Groups

The validity and applicability of the proposed framework was supplemented through the development of Focus Groups. Focus Groups originally emerged as a research method to attain a less directive and dominating role in interview sessions by the researcher (Lettice 1995).

The Wordsmyth English Dictionary (Parks 1998) defines groups as "a collection of things, ideas, or people that are assembled, connected, or related". Groups are based on common experience (Krueger 1994).

A Focus Group interview is an unstructured, free flowing interview with a small group of people. It is not a rigidly constructed question-and-answer session, but a flexible format that encourages discussion. Participants meet at a central location at a designated time. The group consists of an interviewer or a moderator and six to ten participants who discuss a single topic. The moderator introduces a topic and encourages the group members to discuss the subject amongst themselves (Zikmund 1997).

Focus Groups allow people to discuss about their true feelings, anxieties, frustrations and to express the depth of their convictions in their own words. Ideally, the discussion proceeds at the groups initiatives. They are relatively brief, easy to execute, quickly analysed and inexpensive. Their advantage is flexibility as numerous topics can be discussed.

The advantages of Focus Groups can be categorised as follows: (Zikmund 1997)

- **Synergism**: The combined effort of the group will produce a wider range of information, insights, and ideas than will the cumulation of separate secured responses of a number of individuals

- **Serendipity**: It is more often in a group than in an individual interview that some idea will drop unexpectedly. The group also affords the opportunity to develop the idea to its full significance

- **Snowballing**: A bandwagon effect often operates in a group interview situation. A comment by one individual often triggers a chain of responses from other individuals

- **Stimulation**: After a brief introductory period, the respondents want to express their ideas and expose their feelings as the general level of excitement about the topic increases

- **Security**: in the well structured group, the individual can usually find some comfort in the fact that his or her feelings are similar to those of others in the group, and that each participant can expose an idea without being obliged to defend it or to follow through and elaborate it

- **Spontaneity**: In a group interview people speak only when they have definite feelings about a subject, not because a question requires a response. The answers can be spontaneous and less conventional

- **Specialisation**: The group interview allows use of a more highly trained moderator (interviewer) to facilitate the interview and keep it focused while maintaining flexibility

- **Scrutiny**: The group interview permits closer scrutiny to check the consistency of the interpretations. The interview can be observed by other people, recorded or even

videotaped. This allows a post-interview detailed examination to offer additional insights

- **Structure:** The group interview affords more control than the individual interview concerning the range of topics and depth covered. The interviewer or moderator has the opportunity to re-open topics that received too shallow a discussion when initially presented

- **Speed:** The group interview permits securing a given number of interviews more quickly than does interviewing designated respondents.

Krugger notes six limitations for Focus Groups (Krueger 1994):

- The researcher has **less control** over the group interview than on the individual interview. The researcher has to maintain the discussion focused

- Data is **more difficult** to analyse, and care must be taken into not lifting comments out of context

- The technique requires **trained interviewers**. They must use open-ended questions, use techniques such as poses and probes, and must know when and how to move into a new topic

- Groups can **vary considerably**. Groups can have different attitudes to the interview: they can be lethargic or energetic and invigorating. Idiosyncrasies of individual groups can be balanced over a series or group interviews

- Groups are **difficult to manage**. The Focus Group requires people to take time off, to come to a designated place at a given time, to share their perceptions with others

- Finally, the environment must be **conducive to conversation.** Without an effective moderator, a single, self-appointed individual may dominate the discussion. A negative impression of the dominant individual may affect the topic of the discussion and provide subjective interpretations.

In Focus Groups, the direction of the interview and the areas covered are totally in the control of the informant (interviewee), hence called non-directive interview (Robson 1993).

2.2.6.1 Characteristics

Focus Groups interviews typically have six characteristics or features:

- **Focus Groups involve people:** Groups are generally composed of 6 to 10 people. The size is conditioned by two factors: it must be small enough for everyone to have the opportunity to share insights and yet large enough to provide diversity of perceptions

- **Focus Groups are conducted in series:** Solo groups tend to be risky because they might be influenced by internal or external factors and hence yield extraordinary

results. Moreover, a group might be categorised as a "cold group" where its participants are reluctant to participate in the discussion. These factors can be identified in a series of focused group interviews

- **Participants are reasonably homogeneous and unfamiliar with each other:** Groups are formulated of people who are similar to each other. The nature of homogeneity is determined by the purpose of the study and forms the basis for recruitment. Focus Groups have traditionally been composed of strangers. However, researchers are challenging its necessity. Caution should still be used when considering Focus Groups with people who regularly interact as interpretations may be biased

- **Focus Groups are a data collection procedure:** Groups produce data of interest to researchers, as they emphasise the perceptions of participants. They are not intended to develop consensus or to establish a course of action

- **Focus Groups make use of qualitative data:** groups produce qualitative data that provides an insight to the attitudes, perceptions and opinions of the participants. These are solicited through open-ended questions, a procedure in which participants select the manner in which they respond and from observations of the respondents in the group. The researcher serves several functions in the Focus Group: moderating, listening, observing and eventually analysing using an inductive process. The researcher derives understanding based on the discussion as opposed to testing or confirming a preconceived hypothesis

- **Focused groups have a focused discussion:** the topics are carefully predetermined and sequenced, based on an analysis of the situation. The moderator uses open-ended questions, which appear to be spontaneous, but in reality are carefully planned.

2.2.7 Qualitative and Quantitative Data Collection

Data can be defined as "factual information used as a basis for reasoning, discussion, or calculation" (WWWebster 1998(a)). Data and research are strongly interlinked. Patterns in data can be used to perceive information, and information can be used to enhance knowledge, which is the purpose of research.

Data can be extracted from various sources using numerous methodologies, and can be categorised in terms of its format. If the data is based on numbers to provide statistical analysis, it is classified as quantitative, whereas if it is based in words, it is identified as qualitative (Blaxter, Hughes et al. 1996).

The word qualitative implies an emphasis on processes and meanings that are not rigorously examined, or measured, in terms of quantity, amount, intensity and frequency. In contrast, quantitative studies emphasise the measurement and analysis of causal relationships between variables, not processes (Denzin and Lincoln 1994). Quantitative research is viewed as confirmatory and deductive in nature, while qualitative research is considered to be exploratory and inductive (Trochim 1997).

Despite their difference in nature, they are strongly interlinked. Qualitative data can be measured and coded using quantitative methods and therefore quantitative research can be generated from qualitative inquiries (Trochim 1997). The difference divides researchers into positivists, who employ qualitative data, and phenomenologists, who use quantitative data (Lettice 1995).

The author capitalised on their complementary nature through employing qualitative data to determine *what* is important in the context of the research and identify *why*, followed by quantitative data to quantify the level of importance (*how* important).

At the exploratory first stage of the research, qualitative research was applied to analyse the principles of Benchmarking and self-assessment. Qualitative data sources included a wide range of Benchmarking books and journals, total quality management books and journals, a range of management journal articles and books, business journals, engineering magazines, newspaper articles, doctorate and masters theses, Internet based documents and publications, and change management articles.

Quantitative data sources include Benchmarking surveys conducted world-wide, which quantify critical issues concerning Benchmarking practices such as usage and average years of Benchmarking practices in companies.

The reader should note that Benchmarking and Self-Assessment are directly related to Total Quality Management. This is furthermore elaborated on Chapter 3. For a detailed analysis of Total Quality Management, the interested reader should see for example (Juran 1979; Deming 1982; Ishikawa 1985; Creech 1994; Mahoney and Thor 1994; Weimershirch and George 1994).

Throughout the second stage of the research (descriptive stage), qualitative data was employed to analyse the application of Benchmarking practices in Small and Medium sized Enterprises, while quantitative sources were used to quantify its utilisation. Qualitative and quantitative data sources were the same as in the exploratory stage.

To avoid the potential of researcher bias in the formulation of the research problem, the author conducted informal discussions and meetings with academics of engineering and management disciplines, managers from Small and Medium-sized Enterprise and experienced consultants in the fields of Small and Medium Enterprises. This unstructured informal data collection process, in conjunction with the literature review, has played an important role in establishing the essential concepts of the research work.

The third stage of the work involved the development of a structured Knowledge Transfer Framework, based on Benchmarking principles. As the framework evolved through the application of grounded theory, it did not involve any data collection at this stage, as grounded theory involves the discovery of theory from data (Section 2.2.5~). The framework was applied and tested at the final stage of the research where both quantitative and qualitative data were obtained from the participant companies.

Quantitative data was acquired through the use of a questionnaire employing the European Foundation for Quality Management (EFQM) Business Excellent Model. The reasons why the EFQM model was chosen, and a description of the data collection process are provided in Chapter 6.

2.3 Triangulation

The use of evidence from different sources, of different methods of collecting data and of different investigators, where feasible, are all triangulation techniques which enhance credibility (Robson 1993). It is particularly valuable in the analysis of qualitative data where the trustworthiness of the data is always a concern. It provides a means of testing one source of information against other sources. Both correspondences and discrepancies are of value to the research.

Triangulation improves the quality of data and in consequence the accuracy of the findings. Alertness for possible triangulation opportunities is a valuable quality in the enquirer (Robson 1993). Triangulation is meant to be a heuristic tool for the researcher (Janesick 1994).

For this research, literature review provided information on Benchmarking principles and the application of Benchmarking in Small and Medium-sized Enterprises. However, very little detailed information was provided on how SMEs could learn from better performing companies. The author discussed this issue with academics and researchers in Austria, Germany, Ireland and the United Kingdom. In addition, discussions with academics and practitioners in the field were conducted, following the authors presentations at various conferences.

Triangulation was of prime importance during the industrial data collection process. A questionnaire based on the European Foundation for Quality Management Business Excellence Model formed the principal quantitative data source for the assessment of the company, and formed the basis of the Knowledge Transfer Framework. It was therefore important to ensure objectivity in the process. For this reason, data was sought both horizontally and vertically in the participant organisations. The same copy of the questionnaire was distributed to both managers and shopfloor employees, and the aim was to obtain data across the organisation. This was not always possible and in some cases, few responses were obtained from shopfloor employees. Average values were obtained from the questionnaires received and individual responses that displayed a large variance from the average were questioned. The consensus values were employed to assess and represent the company. This research was not interested in categorising the responses of defined groups of professionals, but in collecting reliable and representative responses. For this reason, further attention was not paid to the categories.

2.4 Prominence

This ambitious research methodology is dependent on access to a wide range of industrial practitioners and academic authorities across Europe. The author was assisted in this process by his direct involvement in three European projects: the ESPRIT ICIMS-NOE, the ESPRIT ENAPS and the ESF ADAPT-CORE. The Enterprise Integration department, Cranfield University, is a project member in each of these.

- The European Commission funded ESPRIT "Intelligent Control and Integrated Manufacturing Systems" (ICIMS) Network of Excellence (dossier number 9521), incorporates a total of 125 industrial and academic nodes across Europe. The author presented and discussed various aspects of the research with leading academics and industrial nodes of the Network.

- The European Commission funded ESPRIT "European Network for Advanced Performance Studies" (ENAPS) Project (dossier number 20888), incorporates five academic and industrial partners, and 25 consultant agents from 19 European Countries. Through the ENAPS project, the author realised the potential of applying the Knowledge Transfer Framework at a pan European level. Discussions with both academic and industrialist partners outlined the potential for success.

- The European Social Fund ADAPT "Co-Operation of Regions in Europe" (CORE) Project (dossier number 951448UK8), involves public authorities and regional centres for business development in five regions in the United Kingdom, Germany and Spain. Through this project, the author validated the Knowledge Transfer Framework and established the baseline for transnational Benchmarking.

The author also presented and discussed various aspects of his research at National and International conferences. Interest for the application of this work was received from a wide range of Academic Institutions across Europe and from United States, European Industrialists, Regional Research Centres in Germany and Spain, Regional Government Offices in Greece, Spain and Germany, Business Links and Training and Enterprise Councils in the United Kingdom, the Eastern Region Government Office in the United Kingdom, the Department of Trade and Industry and the Confederation of British Industry in the United Kingdom, the Motor Industry Local Authority Network (MILAN) in the United Kingdom, the Institute of Economic Development in the United Kingdom, the Red Espanola de Cuidades del Automovil (RECA) in Spain, the Austrian Foundation for Quality Management (AFQM) and the European Commission Directorate General III and XIII.

The author fully utilised his involvement in the European Projects and his participation at National and International conferences to discuss and experiment various aspects of his research from the early stages. This proved of significant importance for the development and application of the Knowledge Transfer Framework.

2.5 Conclusive Remarks

The strategy of carrying out the research was directly linked to the nature of the research objectives. To provide a thorough review and evaluation of Benchmarking principles, exploratory research was conducted based on both qualitative and quantitative data. The theory building phase problem was established through descriptive research. Qualitative and quantitative data were employed to identify the issues that face by Small and Medium Enterprises when they engage in a Benchmarking

practices. The exploratory and descriptive research phases formed the literature review for the study.

The generation phase of the research focused on the development of a methodology to help discrete Small sized companies to learn from better practices through a Knowledge Transfer Framework. Grounded theory was applied to develop the methodology, and was evaluated using Focus Groups during the explanatory stage.

Triangulation was applied to develop the research problem, to improve the quality of the data collected and the accuracy and credibility of the research findings. To discuss various aspects of the development and application of the Knowledge Transfer Framework, the author fully utilised his participation at three European Projects and workshop to gain a pan European visibility.

Chapter 3: Benchmarking Fundamentals

3.1 Synopsis

In this Chapter, the principles of Benchmarking and performance assessment are examined. The purpose of conducting a Benchmarking study is outlined and an analysis of the advantages and disadvantages of a Benchmarking process are examined. The types of Benchmarking practices are discussed, and the critical steps are presented.

Self-assessment is presented as a performance evaluation methodology. Its purpose, advantages and disadvantages are discussed and crucial steps in a self-assessment methodology are described. Finally, the three major enterprise assessment models are described and evaluated.

3.2 Benchmarking

Benchmarking is a continuous systematic approach for comparing your own efficiency with those companies and organisations that represent excellence (Karlof and Ostblom 1993).

The history of innovative adaptation is arguably as old as mankind. For millennia, people have observed good ideas around them and adapted those ideas to meet their needs and situations (Bogan and English 1994). In essence, mankind has been conducting Benchmarking exercises throughout the ages.

In the approximate year of five hundred before Christ, a Chinese Army general called Sun Tzu wrote that if you know your enemy and know yourself, in a hundred battles you will never be in peril. If you know yourself but not the enemy, or vice versa, for every victory gained you will suffer a defeat (Krause 1996). Solving problems,

conducting management battles and surveying in the marketplace are all forms of the art of war (Camp 1989). His statement is of vital importance not only for military battlefields, but for the business battlefield. The keyword extracted from his statement is the word "*know*" indicating that knowledge is the key to victory and success. In a battle, it is of significant importance to know your own as well the enemy's strengths and weaknesses. Only then one can benefit from the enemy's weaknesses, minimise the potential of the enemy's strengths, and fully capitalise their strengths to defeat the opponent.

Throughout history, knowledge was sourced from enemy armies through the use of military spies. There are many examples of secret intelligence activities. In the Old Testament, Joseph who was a minister of the Pharaoh at the time, jailed his brothers with the accusation of spying against the nation. In Homers Iliad, Dolonas, a spy from Troia was captured and killed by Diomedes inside the Hellenes camp, searching for strategic information. Phillip, the king of Macedonia, sent men to spy on the Athenians and to report on their military strengths, but the majority were caught from Demosthenis. Annivas, before his victorious expedition in Italy, had learned information about the Roman army resources and their planned battle strategy through the use of spies (Archimandritou 1960). Although some of the above mentioned examples are dated earlier than Sun Tzu's, his statement is recognised as a possible root of Benchmarking (Camp 1989; Krause 1996; Bendell, Boulter et al. 1998). The common ground amongst all the above cases is the search for strategic knowledge concerning the opponents strengths and weaknesses, which will assist toward a victorious conflict. This corresponds to competitive Benchmarking.

Codling reports that records dating back to the ancient Egyptians point to the use of benchmarks in the construction industry. The Egyptians cut a notch in a lump of stone at an accurately determined point, while a flat strip of iron would then be placed horizontally in the incision to act as the support (bench) for a levelling-staff. Using this as a reference point (mark) further heights and distances could be measured. The word benchmark retains the same meaning in surveying and construction (Codling 1992). This accurate measurement tool was referred to as the Royal Cubit (Bendell, Boulter et al. 1998).

The linguistic roots of the word Benchmarking lie in a land surveyors term, where a *benchmark* forms a permanent object of predetermined position and elevation used as a reference point, in determining position or altitude in topographical surveys or tidal observations (Andersen 1998). The term was first used in 1816 by Her Majesty's Topographical Agency in the United Kingdom (Andersen 1998).

Other examples of Benchmarking practices throughout the centuries, include the first design of a flying machine by Leonardo Da Vinci around 1500AD. He designed the first aircraft that could use human body power, incorporating a flapping wing and called "ornithopter", from the ancient Greek work "*ornith*" meaning bird and "*pteron*" meaning wing.

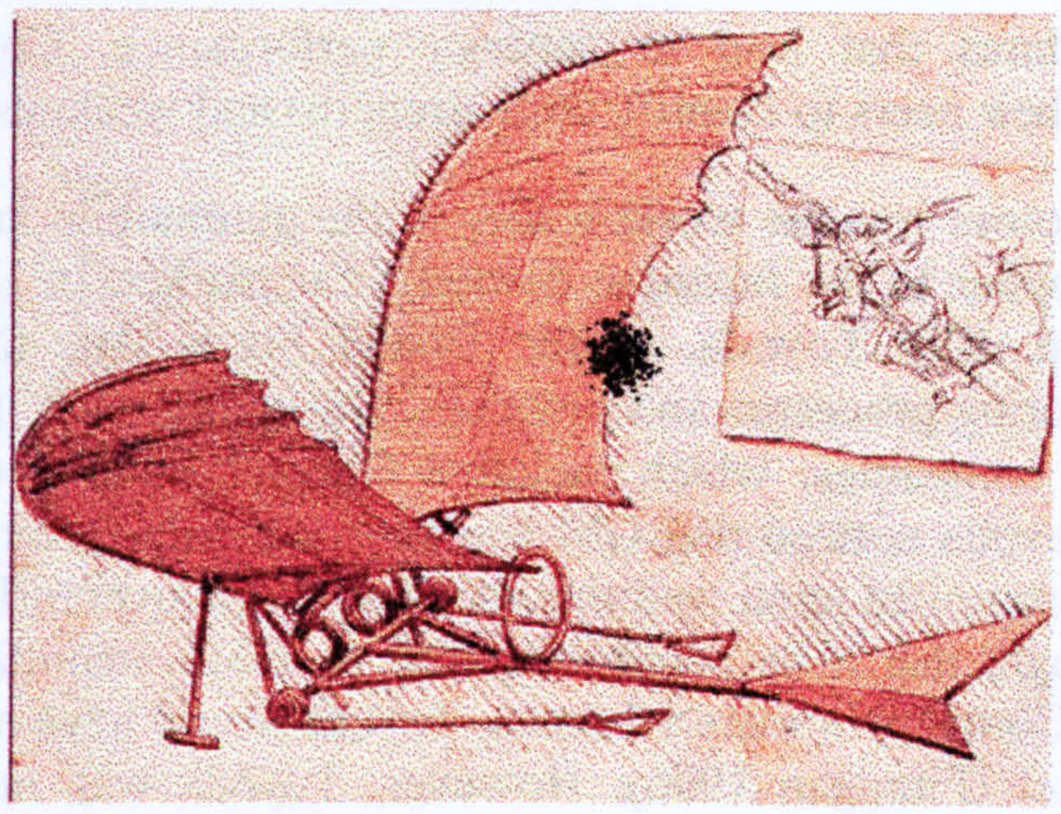

Figure 2: Leonardo Da Vinci Flying Machine

He designed it so a man could flap the wings and make it fly. His main problem was the materials available during his time. Some of the machines weighed as much as 500 pounds and could never fly (Musser 1998). Figure 2 shows the Flying Machine and demonstrates his imaginativity and observation as the design of the flying machine was based on the morphology and body structure of a bird. He sourced best practice from nature and adapted it in his design. He was conducting a form of best practice Benchmarking.

In the late 1800s, British textile mills were the best in the world. Francis Lowell, a New England Industrialist travelled to England to study the manufacturing techniques and industrial design of the best British mills. He observed that the British plants had more sophisticated equipment, but were labour intensive. In 1815 he established a factory in Massachusetts incorporating much of the technology in the British plants, but designed it to be less labour intensive. His success and growth was immense, by 1820 his factory became known as Lowell, Massachusetts. In 1840, Lowell had grown to become the second largest city in America, and the largest manufacturing centre in the United States. This dynamic growth was largely fuelled by Lowell's vision and his ability to creatively adapt best practices observed from the worlds best mills (Bogan and English 1994).

In 1912, Henry Ford visited a slaughterhouse, and watched men cutting meat from the carcasses that were hanging on hooks, mounted on a monorail. After each man performed his job, he would push the carcass to the next station. After the tour was finished, the guide asked Mr. Ford what he thought, and he replied: "Thanks son, I think you may have given me a real good idea". Less than six months later, the worlds first assembly line started producing magnetos in the Ford Highland Park Plant. The idea that revolutionised modern manufacturing and automotive industry was imported from another industry (Bogan and English 1994).

During World War II, it became a common business practice for companies to check with other companies to determine standards for payment, work loads, safety or hygiene factors (Watson 1993). The Benchmarking practices at the time did not investigate the

practices or procedures that lead to superior performance. Companies compared themselves against their peers to identify their strengths and weaknesses (Cook 1995).

In 1950, General Motors was the world leader in the automobile industry, and Toyota was just a small supplier to the Japanese domestic car market. In 1953, the founder of Toyota sent his son, Eliji Toyoda, to the United States. His target was to study American manufacturing processes and practices. During his visit, Eliji Toyoda visited leading automotive companies, which included General Motors, Chrysler, Ford and even Studebaker. Toyoda noticed that GM had superior manufacturing technology that could not be easily improved upon, and that they had large inventories of parts and sub-assemblies. He thought that if he could capitalise on GM's manufacturing technology while avoiding the Company's material costs, Toyota would have a price advantage in the American market (Finnigan 1996). However, Toyoda was mostly impressed by American supermarkets, with the speed and precision with which grocers restocked their shelves at night so that supplies were replenished in time for customers to shop during daytime hours. The observations from his visits were transported back to Japan, where they were adopted, adapted and improved. These visits planted the seeds for the development of Toyota's Just-In-Time Total-Quality-Control programme (Bogan and English 1994).

The growth of the computer industry brought further developments in the use of Benchmarking. In the 1950s, the word Benchmarking began to be used by mainframe computer customers to establish basic performance standards against which a potential supplier could place a bid (Finnigan 1996). The proliferation of suppliers and systems meant that a number of techniques were developed to assist the purchaser to measure and compare performance (Cook 1995). Codling, reports that in the Information Technology industry, complexities of the buying decision multiplied with the advent of an increasing supply chain of hardware and software (Codling 1992). The term Benchmarking was used to give an measure of computer performance.

In the early 1980s, the Remington Rifle Company in Arkansas, United States was wrestling with a technical problem, involving the production of shinier rifle shells. The Company's engineering teams made little progress in their efforts to solve the problem, which originated from customer feedback. A short distance away from their factory was based a cosmetics company called Mabelline. Remington employees surmised that the lipstick cases were not much different in size and shape from rifle shells. Their visit to the neighbouring plant helped Remington employees solve the production difficulties that previously had proven so nettlesome (Bogan and English 1994).

In the late seventies and early eighties, Benchmarking was employed by Xerox to its great benefit (Cook 1995). The Company was losing a significant share of the lucrative photocopier market to its Japanese counterparts (Codling 1992). Xerox pioneered the formal Benchmarking process in 1979 after finding that the manufacturing cost of its products equalled the sales price of their competitor's products (Watson 1993). In 1981, the Company adopted Benchmarking as a corporate wide effort, and in 1983 at the annual meeting of the shareholders, Chief Executive Officer David Kearns announced that Benchmarking would lead the way by providing targets to meet. The Company wanted to have every department measuring its performance against similar operations at other companies, including even lawyers and strategic planners (Finnigan 1996). The

guiding principle for Xerox was "Anything anyone else can do better, we should aim to do at least equally well" (Cook 1995). It was due to the success of Xerox, that Benchmarking has migrated from computing and topographical surveys to the lexicon of business.

Benchmarking practices are known to have been applied throughout the centuries in various cases extracted from the construction industry, the topographical surveys, the military sector, the Information Technology industry and the manufacturing sector. It was not until the end of the nineteen eighties that Benchmarking was recognised as a business tool (Spendolini 1992). The watershed year was 1989 when Robert Camp's book on his Benchmarking experience at Xerox was published. Watson reports that by 1990 about 800 articles had been published in which Benchmarking was listed as a keyword.

3.2.1 Definition

Many definitions have been proposed for Benchmarking (Watson 1993). The definitions provided are restricted to the application of Benchmarking as a business tool and improvement methodology.

The difference between benchmarks and Benchmarking is that the benchmarks are measures to gauge the performance of a function, operation, or business relative to others (Bogan and English 1994), Benchmarking forms the process of comparing benchmarks.

Robert Camp, advanced a formal definition based on experience and success gained at Xerox Corporation, which has a wide application to all business functions despite its originating from the manufacturing area (Camp 1989). The definition originates from David T. Kearns, Chief Executive Officer at Xerox Corporation.

> *"Benchmarking is the continuous process of measuring products, services, and practices against the toughest competitors or those companies recognised as industry leaders."*

The key messages from David Kearns Benchmarking definition are that Benchmarking is a continuous process, it involves measuring, it can be applied in products, services and practices, and involves comparison against the best companies (or toughest competitors). To supplement the formal definition, Robert Camp has introduced the working definition for Benchmarking, which is understandable by operationally orientated business units and functions (Camp 1989).

> *"Benchmarking is the search for industry best practices that lead to superior performance."*

The formal and the working definition, emphasise the measurement and identification of best practices, but do not mention where the "search for best practices" should concentrate (Lema and Price 1995). Another problem with the above mentioned

definitions is it is not emphasised that it is the application of significantly better practices which assist a company to improve its processes, rather than the measurement and search of these practices.

The difficulty of identifying global best practices led the Westinghouse Productivity and Quality Centre to use the following definition (Watson 1993):

> *"Benchmarking is a continuous search for the application of significantly better practices that lead to superior competitive performance."*

Westinghouse does not require teams to discover the very best practice; finding significantly better practices is sufficient to drive the improvement efforts (Watson 1993).

A simplified version of the above definition is provided by Codling: *"an on-going process of measuring and improving products, services and practices against the best that can be identified world-wide"* (Codling 1992). In contrast to the previous definitions, Codling places importance on the use of Benchmarking as a process for performance improvement, and defines the comparators as the best that can be identified world-wide. Her definition implies that the comparator company may not be the global leader, but any company that it is perceived and known to display superior performance. The same principles are observed in the definition provided by Michael Spendolini (Spendolini 1992):

> *"Benchmarking is a continuous systematic process for evaluating the products, services, and work processes of organisations that are recognised as representing best practices for the purpose of organisational improvement."*

Spendolini emphasises that Benchmarking is performed for organisational improvement, and that comparators are the companies recognised as best performers. These companies might be recognised best performers at a local, national or global level.

The author believes that absolutism in the form of best practice is often restricted by the relativity of the search. One can never measure the performance of all the companies world-wide to identify best practice, and therefore the best practice identified through Benchmarking is relative to the company sample size selected.

The American Productivity and Quality Centre (APQC(b), 1992) together with the International Benchmarking Clearinghouse (IBC 1992), have established a more operational definition of Benchmarking:

> *"A process of continuously measuring and comparing an organisation's business processes against business process leaders anywhere in the world to gain information which will help the organisation take action to improve its performance."*

Under the APQC and IBC definition, Benchmarking is a continuous process of measuring and comparing the benchmarks against global performance leaders, to gain

information which will be employed to improve the organisations performance. The difficulty of not knowing what is best (or leading) practice, nor where it can be found can limit the impetus for improvement. Grand resources may be consumed in searching for the global best practice rather than improving and learning from superior practices (Andersen 1998) .

Sarah Cook defined Benchmarking as "*the process of identifying, understanding and adapting outstanding practices from within the same organisation or from other businesses to help improve performance*" (Cook 1995). Her definition establishes that the purpose of Benchmarking is to improve and not evaluate a company, and it is not necessary to search and compare with the best world-wide, but with outstanding companies, which can be sourced locally.

A more advanced definition, based on the APQC and IBC definition, is provided by Bjorn Andersen (Andersen 1996), who denotes that Benchmarking is:

> *"A process of continuously measuring and comparing one's business processes against comparable processes in leading organisations to obtain information which will help the organisation identify and implement improvements."*

The above definition emphasises that Benchmarking is about comparing business processes (not only performance measures), it forms a structured process of external learning, and it is about improvement rather than evaluation. Andersen's definition is characterised as more externally focused than the one provided by Sarah Cook, however, his definition is not prohibitive of comparing performances of different sites within the same organisation.

There was a general consensus in the literature that Benchmarking is a structured on-going, continuous improvement process (Camp 1989; Codling 1992; Karlof and Ostblom 1993; Watson 1993; Bogan and English 1994; Andersen 1996; Finnigan 1996; Zairi 1996; Bendell, Boulter et al. 1998) aiming to change business operations in a structured, proactive and positive fashion, to achieve superior performance.

3.2.2 Rationale

Organisations operate in a business climate in which a plethora of economic, political, social and technological advances establish uncertainty, risk and complexity as fundamental facts of life. As technology, customer expectations and competitive responses continue to change at an increasing rate, companies that learn the fastest have a competitive advantage (Crom 1995). Systematically studying the best business practices, operating tactics and winning strategies of others, an individual, team, or organisation can accelerate its own progress and improvement (Bogan and English 1994).

Benchmarking aims at ensuring that the best practices are followed in an ever changing environment (Lema and Price 1995). It is first and foremost a tool for improvement, achieved through comparison with other organisations recognised as the best in the area

(Andersen 1996), aiming to create value which is greater than the cost of creating it (Karlof and Ostblom 1993).

Benchmarking is a positive, proactive process to change operations in a structured fashion to achieve superior performance. It involves an on-going investigation and learning experience that ensures that best industry practices are uncovered, analysed, adopted and implemented (Camp 1989). Zairi describes the purpose of Benchmarking based on a Japanese principle called *Shukko*, the loaning of employees to other organisations. With these secondments, people are encouraged to go outside their organisation and bring back new practices which will lead to improved performance (Zairi 1996).

Voss indicated that Benchmarking has been shown to increase the understanding of where a unit is positioned relative to its competitors (Voss, Ahlstrom et al. 1997), and enable organisations to provide higher value to their customers and hence distinguish themselves from the competitors (Cook 1995). The basic philosophy of Benchmarking is to provide a structured process to acquire or sustain competitive advantage, by learning from superior performers.

3.2.3 Types

Benchmarking is about comparing. Different types of Benchmarking can be defined based on what is being compared and what it is being compared against.

The majority of the classifications are defined depending on whom one compares against. A number of authors agree on four different types: internal, competitive, functional and generic Benchmarking (Camp 1989; Watson 1993; Andersen 1996; Finnigan 1996; Zairi 1996).

- **Internal** Benchmarking is the performance comparison of units or departments within one organisation
- **Competitive** Benchmarking is a direct product competitor Benchmarking, looking at processes and products
- **Functional** Benchmarking is the comparison of a specific processes or functions with best practice regardless of industrial sector
- **Generic** Benchmarking is the search for best practices in generic processes or functions irrespective of industry.

Karlof and Ostblom distinguish between three categories of Benchmarking (Karlof and Ostblom 1993). Competitive Benchmarking is considered a subset of external Benchmarking, while generic Benchmarking is perceived to be a sub-set, or specialisation of functional Benchmarking.

- **Internal** refers to the comparisons within the same organisation

- **External** Benchmarking makes comparisons with similar operations elsewhere, such as competitors and colleagues in other countries. (Similar to competitive Benchmarking defined above)

- **Functional** Benchmarking, where comparisons are made between functions or processes in different industries.

A hybrid between the two categories is provided by Codling, who identifies three types for Benchmarking (Codling 1992):

- **Internal** Benchmarking which refers to partners within the same company, or division, who may be based in the same or different divisions.

- **External** which is conducted either in different industries but in the same group of companies as in the case of large multinationals, or in different industry sectors sharing similar processes.

- **Best Practice,** which involves finding and comparing against the undisputed leader in the process that is critical to business success – regardless of sector or location.

Codling suggests that competitive Benchmarking is considered as a sub-set of external Benchmarking but its disadvantages outweigh its advantages, as competitors rarely exchange accurate information (Codling 1992). Cook separates Benchmarking into internal, competitive, non-competitive and best practice.

Cook's non-competitive Benchmarking can be considered as a combination of Camp's functional and generic Benchmarking, and similar to Codlings external Benchmarking. Spendolini (Spendolini 1992) identifies five types of Benchmarking, which include **informal** (comparing one's performance, process or approach with others in an unstructured and informal manner), **internal** and **competitive** (similar definitions to Camp), **industry** (similar to Camp's functional Benchmarking) and finally **best practice** (similar to Camp's functional and generic Benchmarking, comparing against best practices). Spendolini forwarded a Benchmarking type classification similar to Robert Camp.

Alternatively, Benchmarking types can be classified in accordance to what is benchmarked. Three types are defined: process, performance and strategic Benchmarking (Bogan and English 1994; Andersen 1996).

- **Process** Benchmarking which focuses on discrete work processes and operating systems. It seeks to identify the most effective operating practices from many companies that operate similar processes

- **Performance** Benchmarking which enables a company to assess its competitive position through product and service comparisons. Reverse engineering, direct product or service comparison, and comparative analysis of operational statistics are the primary techniques applied

- **Strategic** Benchmarking examines how companies compete. It is seldom industry focused and roves across industries to seek and identify winning strategies that have enabled high performing companies to be successful in their marketplaces.

Literature does not suggest a general consensus on the types of Benchmarking, however, the most widely accepted and applied classifications are those provided by Camp and Bogan.

Different types of Benchmarking can be classified by a combination of what is compared and against whom. Andersen established the combination of the various Benchmarking types through the development of a matrix, Figure 3. The matrix illustrates what combination of different types of Benchmarking are supposed to give the highest benefits (Andersen 1996). It is based on the classifications provided by Camp and Bogan.

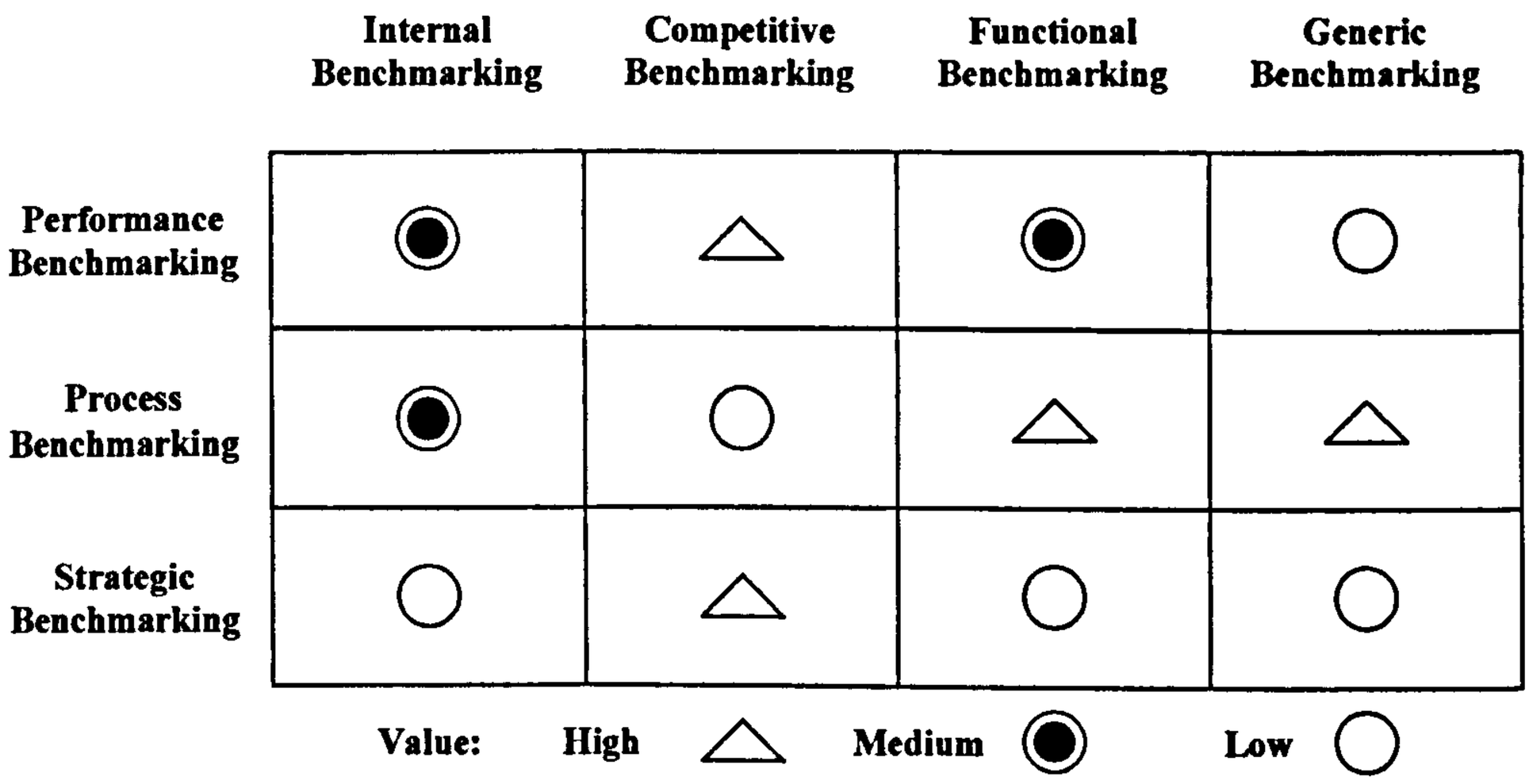

Figure 3: The Benchmarking Type Combination Matrix

Internal Benchmarking has limited value as its internally focused (Andersen 1996). Little new information will penetrate the organisational boundaries, while strategic Benchmarking will be meaningless. A company can benefit substantially from a Benchmarking practice which compares its publicised financial performance indicators and company strategies to their competitors. Process Benchmarking against competitors is seldom viable due to sensitive information exchange. Functional and generic Benchmarking produce the highest value when combined with process Benchmarking. Comparing financial or statistical performance measures, and strategic decisions with companies in different industrial sectors can lead to misinterpretations as critical success factors differ amongst industries (Andersen 1996). For example on-time delivery is not of primary importance for a coasters manufacturer in Bedfordshire however, it is of prime importance for a daily newspaper to deliver its papers on-time.

The European Commission identified three levels for Benchmarking application, with the objective to provide a multiple-layer approach to the use of Benchmarking, and promote its application as widely as possible. The three levels are company Benchmarking, sectoral Benchmarking and Benchmarking of framework conditions or systems (Keegan 1998):

- **Company Benchmarking** is directed at the continuous improvement of management processes in companies. To define the processes to be improved, to identify world-wide best practices, to assess gaps in performance in comparison with the best practices and to understand the underlying reasons for the under-performance, are the steps which should allow a company increase its performance, improve its competitiveness and surpass competition.

- **Sectoral Benchmarking** forms a natural extension of company Benchmarking in that many of the same principles can be applied to that set of enterprises that constitute an industry for which similar types of best management practices are fundamental for competitiveness.

- **Benchmarking of framework conditions** applies to those key elements which affect the attractiveness of the business environment of national regions, the European Union Member States and the European Union as a whole. Some of the elements that can be used for this type of Benchmarking are, for example, labour costs, public expenditure, financing or intangible investments which can influence industrial competitiveness, innovation, labour skills and administrative infrastructures.

The European Commission Benchmarking framework classifies Benchmarking Initiatives in terms of physical location (the company, industrial sectors, regions or nations), and considers the application of Benchmarking types, as defined by Camp and Bogan, under each of the three levels. The thesis focuses on the application of process Benchmarking combined with functional or generic Benchmarking, at a company level (Company Benchmarking).

3.2.4 Methodology

Benchmarking is a systematic process seeking excellence to learn and adopt its operative content and processes to raise an organisations performance to championship class (Karlof and Ostblom 1993). The literature does not show consensus over the number of steps in a Benchmarking methodology. Some employ a four-step process, others go up to twelve. The differences between them are cosmetic (Watson 1993). Most of the approaches employ a common core process model.

Cook, proposes a systematic approach which involves six stages (Cook 1995):

- Identify and understand own processes
- Agree what and who to benchmark
- Collect the data
- Analyse data and identify gaps
- Plan and devise action improvements and
- Finally review the process.

The first and second stages are involved with the "planning" of the Benchmarking process. It is then followed by the "doing" stage where data is collected and subsequently, by the "analysis" stage where data is analysed and interpreted. Finally, phases 5 and 6 are characterised as the "acting" stages, where actions to implement improvements are undertaken.

Karlof and Ostblom have defined 5 phases in a Benchmarking process (Karlof and Ostblom 1993).

- Decide what to benchmark
- Identify Benchmarking partners
- Gather information
- Analyse
- Implement for effect.

Karlof mentions that "the fifth stage involves not only putting improvements into practice, but also developing the organisation and shifting its focus towards performance orientated behaviours. A Benchmarking project cannot claim total success until action has been taken to realise the potential for improvement and the desired results have been achieved." Karlof and Cook are in total agreement over the Benchmarking steps, with the exemption that Cook considers reviewing as a different stage in the methodology. Karlof also adopts the Plan-Do-Analyse-Act methodology.

The Xerox ten-step Benchmarking process model is similar to that proposed by Cook but incorporates a higher detail (Camp 1989):

1. Identifying Benchmarking subject
2. Identifying Benchmarking partners
3. Determining collection method and collecting data
4. Determining current competitive gap
5. Projecting future performance
6. Communicating findings and gaining acceptance
7. Establishing functional goals
8. Developing action plans
9. Implementing plans and monitoring progress
10. Recalibrating the benchmark.

These Xerox ten steps are grouped under five main categories, which are planning, analysis (do), integration, action and maturity. The Xerox model exhibits similarities to the Plan-Do-Analyse-Act methodology

Similarly, Codling considers 12 steps in a Benchmarking study similar to Camp, and groups them into four operational categories (Codling 1992):

1. Planning the study
2. Analysis (incorporating data collection)
3. Action
4. Review and Recycle.

Finnigan and Watson suggest four stages which involve establishing the study plan, conducting the study, diagnosing the data and finally internalising the results and taking action (Watson 1993; Finnigan 1996). The Plan-Do-Analyse-Act is a common core of the approaches described by Finnigan, Watson and Andersen. Andersen employs a five stage model involving (Andersen 1996):

1. Select and document the process to be benchmarked (Plan)
2. Identify the best practice (Search)
3. Observe and analyse how the Benchmarking partner performs his process (Observe)
4. Analyse the causes for the performance gap (Analyse)
5. Implement improvements based on the analysis (Adapt).

Andersen's search and observe stages can be defined as the "do" stage as they involve the acts of searching and collecting Benchmarking data. The similarities to the Plan-Do-Analyse-Act are distinguished.

A common consensus was found from the literature that Benchmarking practices tend to follow the Plan-Do-Analyse-Act process. This is verified by a study and evaluation of forty-two various Benchmarking models by the American Productivity and Quality Centre with the International Benchmarking Clearinghouse, which has demonstrated that each Benchmarking model contained relatively the same four steps. These steps trace the four steps of the Deming cycle for process management (Plan-Do-Check-Act) are (Watson 1993):

1. Planning the Benchmarking project (Plan)
2. Collecting the necessary data (Do)
3. Analysing the data for performance gap and enablers (Analyse)
4. Improving by adapting process enablers (Act).

Successful Benchmarking projects are based on the Deming circle to provide an integrated, systematic, measured approach to completing a Benchmarking study.

3.2.5 Strengths and Weaknesses

Camp notes that Benchmarking provides external focus and comparisons. He describes the strengths associated with Benchmarking by describing the advantages it offers enterprises that adopt its' practice, over companies that do not engage in Benchmarking activities. He suggests that Benchmarking offers an advantage in the following areas (Camp 1989):

- **Defining customer requirements.** Companies that are internally focused define their perceptions concerning customer requirements on past history or personal opinions, whereas Benchmarking can provide the baseline to obtain a better understanding about the market, and obtain a high conformance between business activities and customer perceptions (Camp 1989). Zairi agrees that internally focused businesses that do not employ Benchmarking have a reactive approach to competitiveness and exhibit poor knowledge of customer true requirements (Zairi 1998).

- **Establishing effective goals and objectives.** Companies that do not use benchmarking are lacking external focus and goals and objectives can be characterised as reactive to market pressures. The use of Benchmarking enables a company to become more proactive and develop non-subjective and unarguable goals and objectives. (Camp 1989)Zairi notes that through the use of Benchmarking companies can have access to a limitless pool of ideas and use the market as a starting point for setting their objectives (Zairi 1998), rather than individual perceptions.

- **Developing true measures for productivity.** Camp notes that Benchmarking can be employed to provide an understanding of the strengths and the weaknesses of a business and establish a true measure for the business outputs based on achievable superior practices. Companies that do not use Benchmarking often set their targets following the route of the least resistance (Camp 1989), and consequently may not fully capitalise on their strengths.

- **Becoming competitive.** Companies that do not practice Benchmarking have a low commitment to becoming competitive. They may not exhibit a concrete understanding of the competition, and lack new ideas of proven practices and technologies (Camp 1989). Voss indicated that Benchmarking has been shown to increase the understanding of where a unit is positioned relative to other enterprises (Voss, Ahlstrom et al. 1997), and enables organisations to provide higher value to their customers and hence distinguish themselves from the competitors (Cook 1995). Zairi notes that external comparisons through Benchmarking can assist enterprises to tackle difficult problems to achieve a quantum leap in competitiveness (Zairi 1998).

- **Industry best practices.** The use of Benchmarking enables enterprises to have a proactive culture for change and provides access to a limitless source of superior practices. Companies that do not Benchmarking often engage in frantic catch-up activities leading to average industry progress (Camp 1989).

To summarise, the strengths of Benchmarking are that it offers enterprises access to industry superior practices, assists companies to define their customer requirements and understand their markets better, provides the baseline for the establishment of effective goals and objectives, and assists in the development of true measures of productivity through a better understanding of the business environment and operations. Benchmarking is an investigative process of learning from other practices and can be characterised as a pragmatic search for ideas which would lead to improvements (Spendolini 1994).

Benchmarking is accepted as a management technique to improve business performance (DeToro 1995). The weaknesses are related to the misconceptions concerning the practice of Benchmarking. Cook notes that a weakness of Benchmarking is that it can be seen as "industrial tourism" where a series of costly and lengthy visits to other industrial sites occur, without achieving significant benefits for the organisation (Cook, 1995). DeToro notes that not every benchmarking project requires the conduct of industrial visits, and when the visit happen they need to be productive and well prepared (DeToro 1995).

Another weakness is the danger of "cloning" superior performances without adaptation. Spendolini notes that Benchmarking is not about copying and imitating, but assimilating knowledge (Spendolini 1994). What is best practice for a company cannot be readily transferred to another enterprise without thorough prior understanding of associated issues or company culture (Cook 1995). Similarly, enterprises that do not assimilate knowledge or practices may compare dissimilar elements of their businesses (often addressed as comparing "apples versus pears"), leading to the identification of false improvement opportunities.

Another drawback is that Benchmarking requires substantial planning, process instruction, quality, time, staff support and funding (Spendolini 1994). He notes that the average size for a Benchmarking team consists between four and six people, and the average duration of a Benchmarking project can be between four to six months (Spendolini 1994). This leads to the average investment in a Benchmarking project lying between 16 man-months (assuming a four people team working for 4 months) and 36 man-months. The investment in time, effort, staff and financial resources can be prohibitive for a small sized company of limited resources.

Cook and Camp note that although benchmarking seems to be a simple idea, the implementation requires a systematic approach (Camp 1989, Cook 1995). To minimise the potential of failure, Benchmarking practitioners need to be aware of the weaknesses and the Critical Success Factors.

3.2.6 Critical Success Factors

It is widely recognised that active top management commitment is of significant improvement for the success of a Benchmarking initiative (Camp 1989; Codling 1992; Watson 1993; Bogan and English 1994; Cook 1995; Finnigan 1996; Zairi 1996). Management involvement is essential to remove employee barriers and obstacles to

success such as non-commitment, opposition or reluctance. Moreover, management involvement can ensure that the benefits and outputs of the Benchmarking process are distributed and re-informed, and that a mission statement for the Benchmarking process with confident objectives should be comprehended by all parties involved (Codling 1992; Cook 1995; Zairi 1996). Management should involve the right people in Benchmarking as it is crucial for the success of the process (Cook 1995).

Willingness to change is of primary importance to Benchmarking (Camp 1989; Codling 1992; Bogan and English 1994; Finnigan 1996; Zairi 1996; Bendell, Boulter et al. 1998). Karlof emphasises that there should be a positive attitude to change within an organisation for Benchmarking to flourish (Karlof and Ostblom 1993). This should be emphasised by openness to new ideas and innovative practices (Camp 1989; Karlof and Ostblom 1993; Bendell, Boulter et al. 1998). Employees must be able to combine existing elements of knowledge into innovative solutions (Karlof and Ostblom 1993), and not simply copy better practices (Codling 1992). Better practices must be adopted and adapted.

Benchmarking should be a continuous process (Camp 1989; Finnigan 1996), which would eventually be institutionalised (Camp 1989). This follows the realisation that competition and best practices are constantly changing. The Benchmarking effort should not be a one-time event (Camp 1989).

A clear understanding of the company's current practices and business processes is essential, as this forms the basis for comparison (Camp 1989; Watson 1993). A company must be aware of its strengths and weaknesses prior to engaging in a Benchmarking activity.

One of the foundations of Benchmarking is the sharing of information between Benchmarking partners. Companies must be willing to exchange information with their partners (Camp 1989; Bogan and English 1994; Andersen 1996; Tummala and Tang 1996). Benchmarking requires a spirit of co-operation, and business ethics should be of significant importance (Karlof and Ostblom 1993) during and after the partnership.

The importance of employee education and training on the basics of Benchmarking is stressed (Codling 1992; Bogan and English 1994; Finnigan 1996; Zairi 1996). Benchmarking training should familiarise employees with the basic processes, tools and practices employed, and prepare them to be efficient problem solvers.

As Benchmarking is closely linked with Total Quality Management, emphasis should be placed on ensuring quality and an increase in customer satisfaction (Karlof and Ostblom 1993; Zairi 1996; Bendell, Boulter et al. 1998). Finally, an important aspect of Benchmarking initiative, as with all company initiatives, is the adherence to schedules and resources such as time, funding, people and utilised equipment (Codling 1992; Karlof and Ostblom 1993; Bogan and English 1994; Cook 1995)

3.2.7 Win-Win Benchmarking

Enterprises engaging in a Benchmarking study learn from and compare their practices against enterprises displaying best practices at a sectoral, regional, national or international level (Keegan 1998). Enterprises that are employed as global best practice case studies in a specific business process usually acquire limited benefits from other participant enterprises in the same study. For example, in a study concerning employee satisfaction, the enterprise displaying the best practice can source limited benefits from the under-performers in the area, whereas they could gain by comparing their performance to the best enterprise. Consequently, an unequal information flow can normally be observed, which disadvantages the better enterprises.

Moreover, the selection of a Benchmarking partner can influence the potential of success of comparisons, as enterprises may be dissimilar in terms of size or available resources. For example, if the global best practice in warehouse management for distilleries was the development of a fully automated warehouse management system to store and easily access products, while aiming to decrease available stocks, a finite number of small distilleries would have the resources or the need to install such a system. Consequently, it may not be feasible for all enterprises to compare against the classically identified best practices.

The selection of an appropriate Benchmarking partner can lead to bi-directional information flow, where both the enterprise displaying the best practice and the under-performer enterprise can secure benefits. "Win-Win Benchmarking" partnerships, as named by the author, can be established by the selection of a benchmarking partner in similar performance levels, while performing comparisons in more than one business process. This comes under that acceptance that Benchmarking partners can display best practice (and hence perform excellently) in different business processes (Keegan 1998).

Win-Win Benchmarking ensures that each partner in the study benefits from their participation, through a multi-directional superior performance information flow amongst partners. Consequently, through the implementation of "Win-Win Benchmarking", Benchmarking is transformed from a "one-to-many" Best Practice performance comparison to a "Multi-Directional" Superior Practice Knowledge Transfer.

3.2.8 Total Quality Management

The strong links between Total Quality Management and Benchmarking are evident considering that Benchmarking methodologies are based on the Deming Plan-Do-Check-Act continuous improvement circle.

TQM requires a refocus and redirection of business, a raising of organisational issues, which go beyond conventional product or service quality assurance. It is more than training and teamwork, it is the quest for a self-improving organisation (Zairi 1996). Total Quality Management is a powerful force for change, however, it has limited ability to monitor developments outside a specific industrial sector. Taking some tools

of TQM and problem solving, and developing them into the rigorous Benchmarking process adds the external dimension which provides a cutting edge to achieve competitive superiority (Codling 1992).

Benchmarking is a natural evolution from the principles of Total Quality Management (Bendell, Boulter et al. 1998), and forms an essential element of any total quality strategy as it provides competitive assessment (Finnigan 1996). The integration of Total Quality Management, Performance Measurement and Benchmarking comprises the essential elements of competitiveness.

Benchmarking adds an external perspective to a total quality organisation. It ensures that continuous improvement is tuned towards achieving higher standards of competitiveness, and moves a total quality organisation from continuous improvement to continuous learning (Zairi and Hutton 1995).

3.2.9 Performance Measurement

Measures of performance are important as they provide milestones against which performance can be evaluated (Browne, Sackett et al. 1995). Performance Measurement is a mechanism for providing feedback on achievement. It provides the information through which all activities and processes can be observed and monitored, and is vital to the control and management of the organisation. Feedback is the most important for organisational learning and therefore improvement (Wiele, Dale et al. 1995).

Benchmarking involves identifying competitors and/or companies in other industries that exemplify best practice in some activity, function or process and comparing performances. As a process, it enables companies to be aware of improvements that are orders of magnitude beyond what they could have thought possible (Eccles 1991).

Benchmarking enables external feedback on company achievement, and hence provides the external dimension for Performance Measurement.

3.2.10 Information Technology

Superior practice information sourcing is strongly linked to Benchmarking (Camp 1995). Information Technology plays a key role in information sourcing and Information Management. Databases are very useful in Benchmarking as they capture information on processes and practices. These may be repositories of key performance measures and trends in industry (Camp 1995). Bjorn Andersen's Benchmarking survey undertaken in 1995, indicated that the use and benefits from Benchmarking databases were likely to increase (Andersen 1995).

The potential of databases for Benchmarking studies is significant for the following reasons (Bendell et. al. 1998):

- Identification of potential Benchmarking partners together with information surrounding the area of best practice
- Where a Benchmarking partner has been identified, databases can be used to provide extra information to further determine the suitability of the partner
- To determine performance measurement in terms of comparative business economic/financial data.

The identification of potential Benchmarking partners could be done through business databases such as ABI/Inform or Dunn and Bradsheet, which provide additional information about better practices. With respect to extra information, there are enterprise database such as Kompass Europa which holds additional information for more than 300,000 European Enterprises (Bendell et. al. 1998). Finally, some business related databases offer financial details for listed enterprises, allowing for direct comparisons. Moreover, information concerning better practices and Benchmarking databases have been accessible through the Internet. Various institutions, organisations or networks involved in Benchmarking have begun to offer their services to their customers on the World-Wide-Web.

3.2.11 Summary

Benchmarking provides recognition that profitability and growth come from a clear understanding of how the business is doing, not just against its own performance in the previous year, but against the best they can measure (DTI 1995). The gaps in performance between the best companies and the "also-rans" can be vast: manufacturing industry leaders typically generate products up to two and a half times faster than the industry average and at half the cost (Economist 1991). Benchmarking has become a valuable Performance Measurement, evaluation and improvement technique. It has its roots in the drive to seek enhanced competitive advantage by learning from comparative performance viewpoints on an internal or external basis. These comparisons are based typically on strategic, process or performance considerations viewed from either an internal, competitive, functional or generic business perspective. Benchmarking is based on the Deming Plan-Do-Check-Act cycle for process management and provides external focus for Total Quality Management Initiatives.

3.3 Performance Assessment

The basis of a Benchmarking process is the assessment of current performance to identify opportunities for improvement and development. The assessment provides the

basis for comparison, both internally and externally, and shows the progress which has been made over time (BQF 1995).

Company audits can be conducted either externally or internally. An external independent audit is conducted by one or many assessors who have undergone some training to ensure consistency and objectivity, while an internal audit or self- assessment is performed within the enterprise, by company employees who should preferably be trained.

3.3.1 Independent Audit

Independent audits, or third party assessments, are usually performed by experienced and trained consultants in the field. The assessors are not company employees and can provide an objective view of the company business operations, providing an unbiased view of the company. Through a series of meetings and discussions with company employees, the assessors will document business issues and plans, and identify strengths and areas for improvement.

The disadvantages of external assessment are that it can be expensive for a company, and there is always the danger of subjectivity in the evaluation when conducted by a single assessor. Van Der Wiele conducted an examination of assessor training and concluded that (Wiele, Williams et al. 1995):

- Assessors who have been trained more than once on a specific model, give significantly lower scores in the assessment than those who are trained for the first time

- There is less variation between the scoring of those assessors who have undertaken two courses of assessor training

- Language barriers can influence the assessors scoring.

Different assessors can provide relatively different assessment for a specific company. To ensure objectivity in the assessment process it is favourable to conduct it through a team of highly skilled assessors, who share the same Total Quality Management vision and judgement paradigms, employing pre-defined scoring criteria (Conti 1997).

Assessors can conduct an informal Benchmarking process by comparing the performance of the company with what they perceive to be best practice according to their training and experience. The assessment is usually concluded with the submission of a report to the company highlighting strengths and weaknesses, and providing recommendations for improvement.

3.3.2 Self-Assessment

The relative ease of starting a new activity internally, the lower resource implications and the higher assurance of gaining co-operation, nominate internal Benchmarking as the most preferable type which organisations choose to start their Benchmarking activities (Dence 1995). For the same reasons, self-assessment has been established as a preferable methodology for companies to assess their performance.

3.3.2.1 Definition

The European Foundation for Quality Management has defined self-assessment as (EFQM 1998):

> *"An internal, comprehensive, systematic and regular review of an organisation's activities and results referenced against a model of business excellence."*

Self assessment is a vital diagnostic tool, as it helps a company to learn about Total Quality Management practices, realise how far down the Quality road they have travelled, how much further they need to travel and how they compare to others. The primary purpose of undertaking self-assessment should be to drive business improvement (EFQM 1998).

3.3.2.2 Objectives

Van der Wiele et al, conducted a survey of 519 companies across Europe and outlined the five most important objectives (from a list of 16 prescribed issues) for organisations starting self-assessment (Wiele, Dale et al. 1995):

- Find opportunities for improvement
- Create focus on a model of Total Quality Management
- Direct the improvement process
- Provide new motivation for the quality improvement process
- Manage the business.

This is also supported by Coulambidou and Dale in a survey concerning the use of Quality Management Self-Assessment in the United Kingdom. They identified the five most important reasons for starting a Self-Assessment process (Dale and Coulambidou1995):

- Find opportunities for improvement
- Direct the improvement process

- Establish Internal champion within units
- Manage the business
- Create focus of a Model of Total Quality Management

The key issues emerging from the above are that self-assessment is often employed as a management tool to find, direct and motivate improvement based on TQM. This is also supported by Caravatta who notes that the goal of Self-Assessment is to identify what an organisation is doing well, what it is not doing well, what it is not doing at all, and most important, where and how it can make measurable improvements (Caravatta 1997). This is also supported by Davis et. al. who note that companies use Self-Assessment to evaluate their current business processes and employ the results to drive Continuous Improvement and stay competitive (Davis et. al 1996).

Self-Assessment allows organisations to discern clearly their strengths and areas in which improvements can be made and culminates in planned improvement actions, which are then monitored for progress. Zaremba and Crew from their experience in conducting self-assessment at Royal Mail in the United Kingdom, note that it provides a credible framework of excellence to measure business unit performance, identify gaps, and subsequently, plan and prioritise improvement activities (Zaremba and Crew 1995). It is an organisation-wide exercise and calls upon the contribution of all key functions and the involvement of a multi-functional group. It relies on objectivity, transparency and honesty, and is an evidence-based approach. No judgement can be accepted unless it is supported by facts and accurate information (Aly 1997).

Davis et. al. note that Self-Assessment has gained importance in recent years, as organisations have had to increase their efforts to stay competitive (Davis et. al. 1996).

3.3.2.3 Types

The European Foundation for Quality Management outlines six types of self-assessment (EFQM, 1998):

- The Award Simulation Approach, which involves developing a full submission document (75 page report) for the European Quality Award. It involves a team of trained assessors, and provides a high degree of accuracy in the scoring profile. This approach may be ambitious and perplexing for organisations which do not have previous experience at self-assessment.
- The Pro-Forma Approach, involving the creation of a set of pro-formas, which employees complete. The pro-formas must provide a description of assessed criterion, the strengths and weaknesses of the enterprise in the considered criterion, and provide supporting evidence. The pro-forma approach provides a list of the strengths and weaknesses, allows the documentation of evidence, but does not provide a detailed assessment as its often employed to assess high level criteria.
- The Workshop Approach, involving the use of workshops to assess the enterprise performance. The management team is responsible for gathering the data and

presenting the evidence at a workshop. There are five components to the process: training of the assessors, data gathering, scoring workshop, agreement of improvement actions and reviewing against action plans. The Workshop Approach is less robust and rigorous than the Award Simulation Approach, requires excellent preparation and facilitation to ensure the management team are comfortable and fully prepared for the process.

- The Matrix Chart Approach, involves the creation of a company specific achievement matrix, which typically consists of a series of statements of achievement against a scale of scores between 0 and 10, or similar. The approach can be used to assess any level of an organisation by either the management team, or a representative of the Business Unit undergoing the Self-Assessment process. The approach is simple to apply, involves the management team, and it is particularly suited for small enterprises, enabling all the employees to participate in the assessment. However, the approach does not provide detailed identification of the enterprise strengths and weaknesses, and is not as robust as the Award Simulation Approach.

- The Questionnaire Approach, which uses a questionnaire to collect widespread data. The approach is simple to use, easy to compute and comprehend the scores, provides a good introduction to Self-Assessment and can be used in parallel to the Workshop Approach. However, not everyone may understand the questions, accuracy depends on the quality of questions asked, and it does not generate areas of strengths and improvements. Moreover, the use of questionnaires provides information on what people think, but does not provide any reasoning.

- The Peer Involvement Approach, which is similar to the Award Simulation Approach but does not involve preparing an Award Assessment document. It is less prescriptive than the Award Simulation Approach, and provides a comprehensive list of strengths and areas for improvement. However, it is a resource intensive approach, relying on the commitment of the business units as there is no direct incentive (for example: preparing for a submission for the European Quality Award as in the case of the Award Simulation Approach).

The selection of the appropriate self-assessment approach depends on the enterprise. The implications of the various approaches in terms of time, cost and quality of outcomes must be considered in the context of the organisations' culture before selecting a desirable approach.

3.3.2.4 Methodology and Implementation

The self-assessment process, regardless of the selected approach, can be divided into eight general steps, according to the European Foundation for Quality Management, shown in Figure 4 (EFQM 1998):

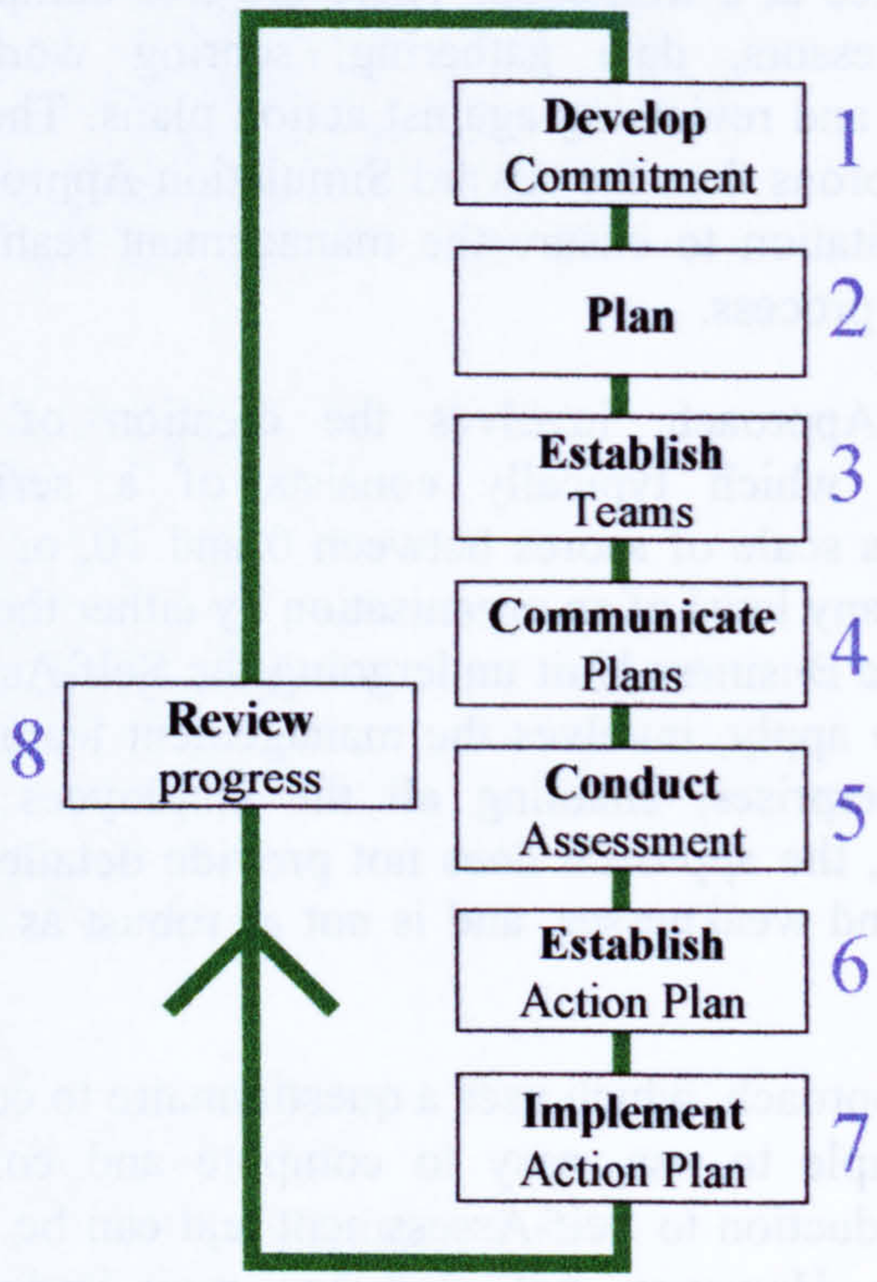

Figure 4: Self-Assessment Process

The first stage of the self-assessment process is to gain management commitment, which as with Benchmarking, is crucial for the success of the process. The second phase forms the planning of the process and involves the identification of the data collection methodology, a possible pilot study and the definition of the assessment process boundaries through the selection of participant business units.

The third stage encompasses the establishment of the teams which will perform the assessment and educate the employees who will be directly involved. Selection of key and relevant people is crucial for the process. The team must be familiarised with the process and the responsibilities to which its members must be assigned. The next stage involves the communication of the purpose of self-assessment, underpinning customer and business prosperity, which is followed by the data collection and scoring process. Data collection may take different forms such as individual and group interviews, workshops, questionnaires or meetings. The analysis of the results will provide information concerning which areas of the business underperform. Any differences between the different team scores must be sorted out at this level, and a consensus reached to arrive at a common position on the scores (Davis, Khodabocus et al. 1996).

The sixth stage involves establishing an action plan to improve those critical for the business areas that are observed to underperform. Improvements are set, followed by the setting of milestones to safeguard improvement. The action plan must be communicated so that all employees are aligned with the improvement process, and at the seventh stage improvement teams are set-up to implement the action plan.

The process does not in itself improve the organisation as it provides a snapshot of the company performance, a "moment in time" picture of the status of the organisation. It is

vital to ensure that reviewing process against the action plan is part of the normal business review process of the organisation and not a separate activity (EFQM 1998).

Finn and Porter conducted an analysis of the employee involvement levels in self-assessment, using data obtained from 33 United Kingdom based organisations (Finn and Porter 1994). The majority (67%) of the respondents employed less than 10% of their workforce in the activity and only 9% involved 50% or more of their workforce. The large majority of the companies with less than 10% involvement were in the first year of self-assessment. Companies with longer experience were more likely to involve more employees.

Dale and Coulamidou present the outcomes of a survey of 19 companies known to be using or interested in self-assessment and of 120 companies who are not known to conduct self-assessment, based in the United Kingdom (Dale and Coulambidou 1995). Seventy two (60%) of the 120 companies had not started self assessment, and almost half of those (37 companies) did not have any plans to engage in self-assessment. The main reason is that companies are unaware of the benefits of the process. Typical comments obtained from the companies included: "*Why should we*?", "*The small size of the business makes a formal approach too intensive*", "*It hasn't been proposed by anyone that we should do so*" and "*Probably too blue sky...*".

3.3.2.5 Strengths and Weaknesses

The objectives of companies that employ Self-Assessment practices were described in Section 3.3.2.2. These can be extended to describe the strengths of Self-Assessment.

Companies use Self-Assessment to evaluate their current business processes and employ the results to drive Continuous Improvement and stay competitive (Davis et. al 1996). Self-Assessment is about assessing an enterprise to find opportunities for improvement, create focus on Total Quality, direct improvement activities to enhance business performance, manage the business and provide new motivation for improvement. It is about knowing the strengths and weaknesses of an enterprise and provides a "moment in time" picture of the status of the organisation (EFQM 1998).

The weaknesses of self-assessment are presented by Dale and Coulambidou, as obstacles and difficulties that companies experienced in implementing and operating the self-assessment process (Dale and Coulambidou 1995). The greatest problem was gaining top management commitment and persuading them to formalise the use of self-assessment. Another problem was in relation to the data collection process and its subsequent interpretation, such as variability in scoring, how to collect data and how to deal with zero scoring. Blame culture can hinder self-assessment, as the management might blame employees for low performance, rather than concentrating on the improvements, which can lead to a high emphasis being placed on the scores.

Conti mentions that another danger-weakness in self-assessment is retaining emphasis on the scoring, and the second risk is the transformation of the self-assessment process from a diagnostic approach to an audit-like assessment (Conti 1997), where importance is not placed on how to improve the weaknesses but on how to emphasise the strengths.

3.3.2.6 Critical Success Factors

Finn and Porter elaborate that self-assessment involves people in the regular and systematic review of their processes and results, and allows an organisation to identify strengths and weaknesses as well as enabling the process of Total Quality Management (Finn and Porter 1994).

Numerous factors tend to be stressed as facilitators for successful implementation of Total Quality Management. Three main categories include leadership and commitment, employee involvement and education and training (Zairi and Youssef 1995). This is also supported by Dale and Coulambidou, who note that the most important critical success factors for Self-Assessment are (Dale and Coulambidou 1995)

- Training of the people who will conduct the assessment
- Defining in advance the way in which self assessment will be used
- Involving senior management

Many companies realise that it is not self-assessment that establishes bottom line gains, but the improvement system initiated by the process (Davis, Khodabocus et al. 1996). This is emphasised by Ton van der Wiele and Dale, as self-assessment has to be linked to feedback and communication of the results on a company-wide basis.

To summarise, the most important factors for the success of a self-assessment process include: top management commitment in the process, training of people to conduct the self-assessment, employee involvement in the process, communication of results and the link between Self-Assessment and improvements.

3.3.2.7 Benchmarking

Finn and Porter report that the great majority (88%) of the companies believe that self-assessment can potentially facilitate Benchmarking. The key themes arising from their work are (Finn and Porter 1994):

- Self-assessment helps focus on award winning companies, which as best in class are ideal Benchmarking partners
- Self-assessment helps focus on key areas, and therefore helps identify processes to benchmark
- Self assessment helps to identify an organisations strengths and weaknesses, therefore indicating Benchmarking priorities
- Self-Assessment is a form of Benchmarking.

Self-assessment facilitates Benchmarking in such a way that the two techniques are so interlinked as to be inseparable (Finn and Porter 1994). The introduction of quality

awards and more specifically of the Malcolm Baldrige National Quality Award in 1987, had led to the widespread use of self-assessment (Conti 1997).

Finn and Porter concluded that self-assessment facilitates benchmarking (Finn and Porter 1994). Design to Distribution (D2D), a subsidiary of the computer systems group ICL and a winner of the 1994 European Quality Award, employs self-assessment and Benchmarking practices to measure their processes against their competitors, to improve efficiency, to reduce defects and provide better value for customers (Davis et. al 1996). Tandberg Data in Norway, uses self-assessment and Benchmarking to evaluate the relevance of chosen strategies, the effectiveness of translation of strategies into actions and the results obtained (Jeneson 1995). The Post-Office in the United Kingdom employs self-assessment and benchmarking as a means of business development (Jackson 1998). Other enterprises that employ self-assessment and benchmarking practices to improve their competitive edge include TNT UK Ltd (Powers1997), Rolls Royce (Pearson 1998) and British Aerospace Ltd (McCoy 1998).

Self-Assessment is essential to the success of Benchmarking. Unless you know where you are and how you are performing today, how will you know where you are going or recognise if you have got anywhere? (Codling 1998)

3.3.2.8 Summary

Self Assessment is strongly linked with Total Quality Management. Ton Van der Wiele, Dale et. al. note that Self-Assessment helps management understand what Total Quality Management is about and how important it is for an organisation (Ton Van der Wiele, Dale et. al 1995). Companies employ self-assessment practices to evaluate their systems and processes.

It provides a sense of direction as to what needs to be improved, an assessment based on objective data, a structured approach to business improvement and the means to Benchmarking both internally and externally against other organisations who employ the same performance assessment model.

3.4 Performance Assessment Models

Companies have increasingly accepted that Total Quality Management is the way of managing a business to gain competitive advantage thereby ensuring long term success by meeting the needs of their customers, employees, financial and other stake-holders and the community at large (Hakes 1996).

Davis states that many organisations across Europe and the United States are using self-assessment to evaluate their systems and processes against a model for continuous improvement (Davis, Khodabocus et al. 1996). The most widely employed models are the Deming Prize Model in Japan, the Malcolm Baldrige Award Model in the United

States and the European Foundation for Quality Management Business Excellence Model in Europe.

3.4.1 The Deming Prize Model

The Deming prize was established by the board of directors of the Japanese Union of Scientists and Engineer in 1951 to honour the contributions of D. Edwards Deming to the quality control movement in Japan. The prize is awarded in three categories (APQC(b) 1992):

- the Deming Application Prize for Division
- the Deming Application Prize for Small Business
- the Quality Control Award for Factory.

Its primary purpose was to spread the quality gospel by recognising performance improvements following from the successful implementation of company wide quality control. The Deming Prize model consists of ten primary factors shown in Figure 5 (Ghobadian and Woo 1996).

Figure 5: The Deming Prize Model

The model for the Deming Prize with all sub-category criteria is shown in Appendix A. All criteria are equally weighted. The checklist explicitly identifies the factors and procedures, which underpin total quality control, such as seeking for specific techniques and approaches such as Statistical Process Control, Quality circles and the utilisation of standards. The assessment implicitly assumes that the final quality is the result of a number of actions, factors and processes (Ghobadian and Woo 1996).

A senior executive checklist is provided to emphasise the importance of top management commitment, and provide a list of actions. The checklist is attached in Appendix A. Any company that qualifies for the Deming Prize will receive it- the prize is awarded without external competition. There is no maximum number of companies who may receive the award in a given year.

3.4.2 The Malcolm Baldrige National Quality Award Model

"The Malcolm Baldrige National Quality Award is helping U.S. companies satisfy customers and improve overall company and capabilities." William J. Clinton

The Malcolm Baldrige National Quality Improvement Act of 1987 was signed by United States President Ronald Reagan on August 20, 1987. The Act establishes the U.S. National Quality Award, to promote quality awareness and to publicise successful quality strategies (NIST 1998). The Baldrige Quality Award was established for two main reasons: to raise the consciousness of USA business leaders regarding the issue of quality, and to provide a comprehensive framework for measuring quality efforts (Ghosh, Handfield et al. 1997).

The Criteria for Performance Excellence provide organisations with an integrated, framework for implementing and assessing processes for managing all operations. The Criteria consist of seven Categories (NIST 1998):

1. **Leadership:** The company's leadership system, values, expectations, and public responsibilities

2. **Strategic Planning:** The effectiveness of strategic and business planning and deployment of plans, with a strong focus on customer and operational performance requirements

3. **Customer and Market Focus:** How the company determines customer and market requirements and expectations, enhances relationships with customers, and determines their satisfaction

4. **Information and Analysis:** The effectiveness of information collection and analysis to support customer-driven performance excellence and marketplace success

5. **Human Resource Focus:** The success of efforts to realise the full potential of the workforce to create a high performance organisation

6. **Process Management:** The effectiveness of systems and processes for assuring the quality of products and services

7. **Business Results:** Performance results, trends, and comparison to competitors in key business areas -- customer satisfaction, financial and marketplace, human resources, suppliers and partners, and operations.

The whole review process is based on the seven criteria, sometimes referred to as the "seven pillars" of the Baldrige Model. These criteria can be grouped under four groups (Loomba and Johannessen 1997): the driver, the system, the measure of progress and the goal. Figure 6 illustrates the Baldrige Award model, incorporating the scores that are allocated to each of the seven criteria.

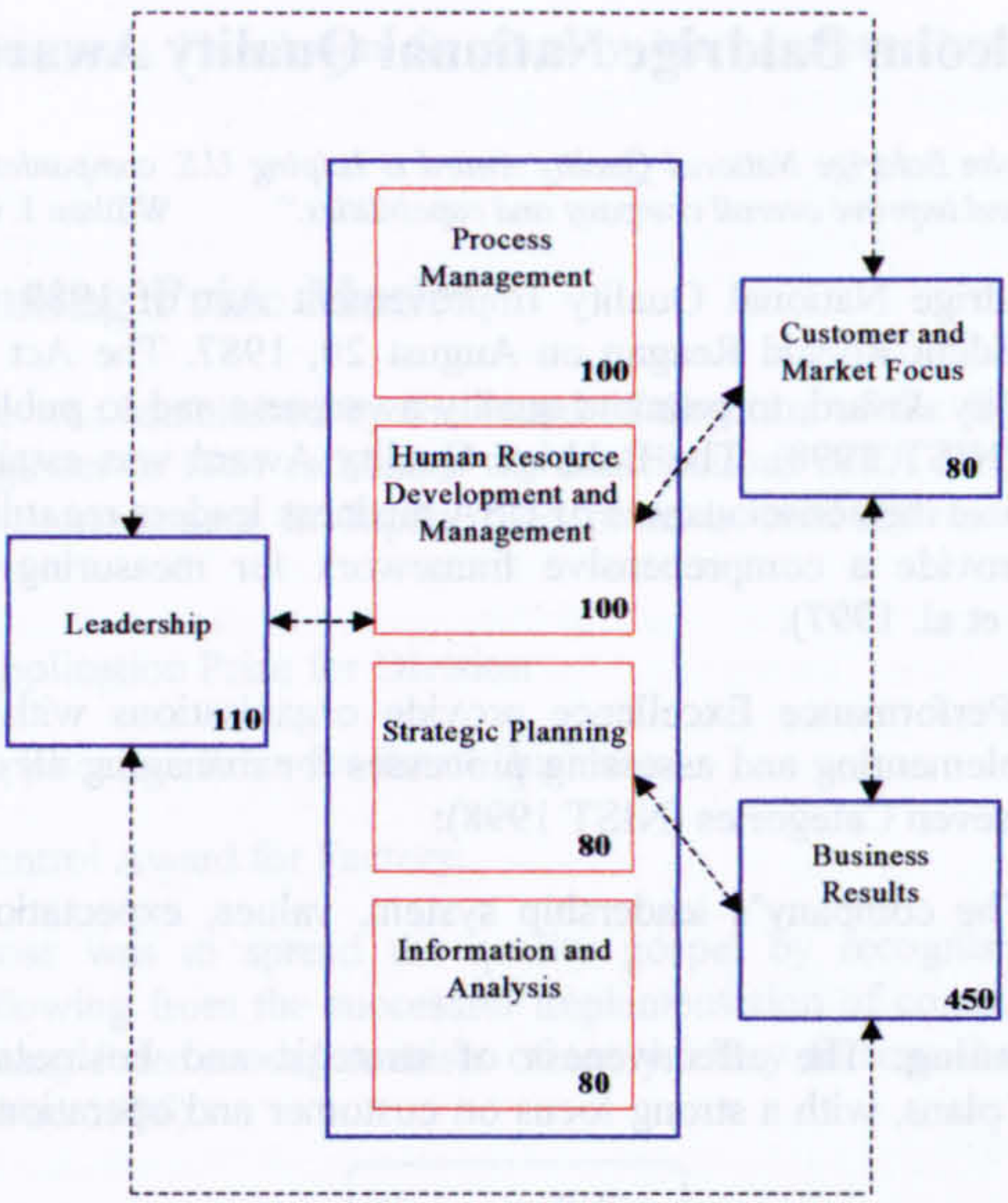

Figure 6: The 1998 Malcolm Baldrige Quality Award Model

The senior management leadership provides the driving force (driver) to create the values, expectations, goals and the systems to guide and sustain the pursuit of quality excellence in satisfying customer requirements and corporate performance improvement. Process management, human resource development and management, strategic planning and information and analysis provide a system to develop well defined and well designed processes for meeting customer satisfaction and corporate performance results. The business results provide the fact based framework for measuring the progress and challenging actions in delivering the improved customer value and company performance. The basic aim (goal) of the process is the delivery of ever-improving value to the customers, which is reflected in the customer focus category (Tummala and Tang 1996).

The maximum score a company can attain under the Malcolm Baldrige Model is 1000 points. The seven principle criteria with their sub-criteria and the corresponding scores are listed in Appendix A.

The Malcolm Baldrige National Quality Award is awarded on a yearly basis to two companies under each category:

- Manufacturing companies
- Service companies
- Small businesses.

Most companies use the award as a quality blueprint to improve their quality to the point where they are as competitive as possible in the marketplace without competing for the award (Tummala and Tang 1996).

3.4.3 The European Foundation for Quality Management Business Excellence Model for the European Quality Award

"The battle for Quality is one of the prerequisites for the success of your companies and for our collective success". Jacques Delors

The European Foundation for Quality Management (EFQM) was founded in 1988 by the presidents of 14 major European companies, with the endorsement of the European Commission. Its mission is to stimulate and assist all organisations throughout Europe to participate in improvement activities, leading ultimately to excellence in customer satisfaction, employee satisfaction, impact on society and business results.

The EFQM has a membership of over 600 European organisations as per 1st of August 1997, all of whom are committed to improving efficiency, effectiveness and achieving business excellence. The EFQM mission is (EFQM 1997):

- To stimulate and assist organisations throughout Europe to participate in improvement activities leading ultimately to excellence in customer satisfaction, employee satisfaction, impact on society and business results; and
- To support the managers of European organisations in accelerating the process of making Total Quality Management a decisive factor for achieving global competitive advantage.

The European Foundation for Quality Management Business Excellence Model (BEM) is rapidly being adopted by organisations across Europe as a framework, which helps define and drive towards excellence within the organisation (Barnsley 1997).

The EFQM Business Excellence Model has an important role to play in enhancing the competitive position of European companies in the world market by reinforcing the importance of quality in achieving competitive advantage and in stimulation and assisting the development of quality improvement activities (Hakes 1996). It is based on the premise that customer satisfaction, people satisfaction and impact on society are achieved through leadership driving policy and strategy, people (employee) empowerment, resources and processes, and that this leads ultimately to business results (Davis, Khodabocus et al. 1996).

The Model tells us that "customer satisfaction", "people (employee) satisfaction" and "impact on society" are achieved through "leadership" which drives the "policy and strategy", "people management", "resources" and "processes", leading to excellence in "business results". The EFQM model consists of nine criteria as follows (EFQM 1997):

1. **Leadership,** which investigates how the behaviour and actions of the executive team and all other leaders inspire, support and promote a culture of Total Quality Management

2. **Policy and Strategy,** which analyses how the organisation formulates, deploys, reviews and turns policy and strategy into plans and actions

3. **People Management,** is concerned with the extent to which the organisation releases the full potential of its people

4. **Resources,** which investigates how the company manages resources effectively and efficiently

5. **Processes,** which analyses how the enterprise identifies, manages, reviews and improves its processes

6. **Customer Satisfaction,** which examines the extent to which the organisation is satisfying its external customers

7. **People Satisfaction,** which is related to how well the organisation is satisfying its employees

8. **Impact on Society,** which focuses on what the organisation is achieving in satisfying the needs and expectations of the local, national and international community at large, as appropriate

9. **Business Results,** which emphasise the organisation's achievement in relation to its planned business objectives and in satisfying the needs and expectations of everyone with a financial interest or other stake in the organisation.

The dynamic relationships among the nine criteria are shown in Figure 7. As in the case of the Baldrige Award Model, a maximum score has been assigned to each of the criteria.

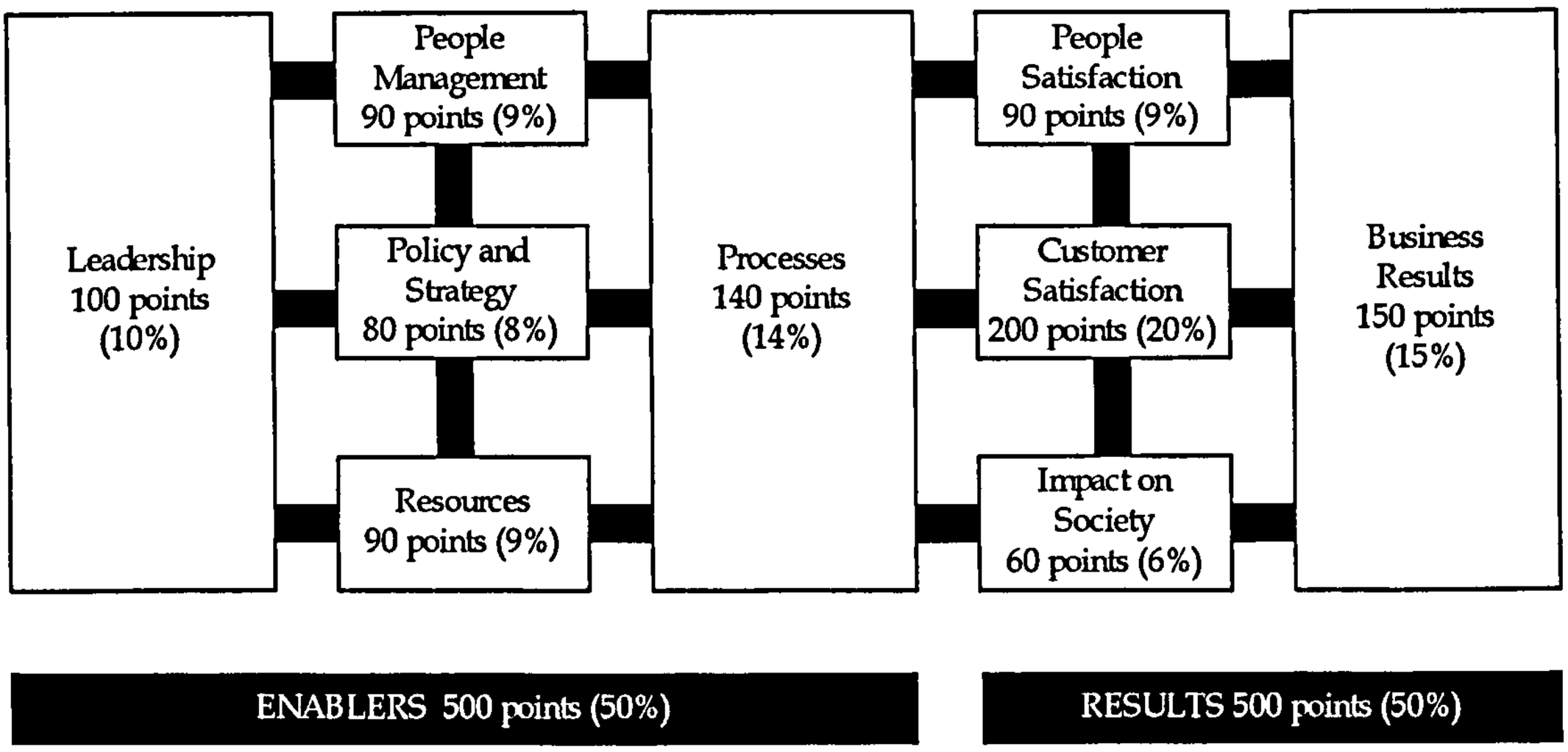

Figure 7: The EFQM Business Excellence Model

The elements of the model are grouped under the enablers and results categories. The enablers are policies and processes that drive the business and facilitate the transformation of inputs to outputs and outcomes. The results are the measure of the level of output and outcome attained by the organisation (Ghobadian and Woo 1996). The enablers are: *leadership, people management, policy and strategy, resources and processes*, while the results: *people satisfaction, customer satisfaction, and impact on society followed by business results*. Enablers and results are each valued at 50% of the total score.

The nine principle criteria with their sub-criteria, and their corresponding scores are listed in Appendix A. The maximum score a company can attain under the EFQM Model is 1000 points.

3.4.4 Review of the Award and Assessment Models

All the three major models were developed to assist companies in the ways of managing a business to gain competitive advantage. The oldest of the three major awards, the Deming Prize, was established to ensure that good results are achieved through successful implementation of company wide quality control. It serves as a symbol for company-wide quality efforts, the pursuit of continuous improvement and the extension of quality management to the suppliers of the firm. Its framework is focused on the implementation of a set of principles and techniques, such as process analysis, statistical methods and quality circles (Bohoris 1995). However, the Deming prize audit framework is not typically regarded as being sufficiently transparent to be used for self-assessment. While the assessment process is vigorous, it is not clear what weighting is given to each part of the model, how the judgements are made, and how consistency in the application of the model is supported, which results in the Deming Assessment Framework not being readily transferable as a self-assessment process (Hakes 1996). Moreover, certain examination criteria such as human resource management, customer satisfaction, impact on society and operational results are not included in the Deming prize (Bohoris 1995).

The EFQM and Baldrige models attempt to identify key processes which affect total quality and link these with the outcomes and outputs attained. They attempt to establish cause and effect between processes employed and results, and the models are not solely concerned with the quality of the outputs. They are both based on the notion that it is extremely unlikely that high quality offerings can be delivered unless the environment is designed to support the attainment of the goal (Ghobadian and Woo 1996).

The Malcolm Baldrige award model was established to promote quality awareness, understand the requirements for quality excellence, and share information about successful strategies. Its overall approach still places emphasis on customer satisfaction to achieve competitiveness (Bohoris 1995).

The Baldrige model has undergone significant changes in the recent years following criticism concerning the lack of result orientation. In the past, the model has been criticised for not reflecting outstanding or even exceptionally good product or service

quality, as this corresponded to only a maximum of 250 points out of 1000. The remaining 750 points were assigned to other important aspects such as management of systems, processes and planning (Tummala and Tang 1996). In recent years, emphasis has been placed on the outcomes with a total of 450 points (45% of total score) being attributed to the results section (business results) of the Malcolm Baldrige Award Model. This has increased the resemblance between the two models, as the EFQM model results assigns an equal weight of 500 points to the enablers and the results elements.

One of the main differences between the EFQM and the Baldrige Award model is that the former does not incorporate any relevant enabler for the customer satisfaction result. The third criterion of the latter forms the "customer and market focus", which provides a process for customer orientation which is not directly dealt with by the use of the EFQM model (Zink, Hauer et al. 1994). Another difference is that the Baldrige Award Model does not specifically consider the impact of business on society with the same emphasis as the EFQM model. Even though it includes some of the related aspects such as business ethics, public health and safety, environmental protection and waste management in the leadership criterion, the EFQM model covers more aspects in a more detailed fashion under the impact on society element (Tummala and Tang 1996) than the Baldrige Model.

The main strength of the EFQM model is the classification of the model elements under the twin groups "enablers" and "results", which is absent within the MBNQA (Zink, Hauer et al. 1994).

Quality awards have helped focus attention on quality and have facilitated a better understanding of the underlying issues (Ghosh, Handfield et al. 1997). All three major models, and their derivative models, provide a framework for implementing a quality programme and establishing the benchmarks for measuring future progress.

3.4.5 Summary

The three principal models employed for assessing a company performance are the Deming Prize model, the Malcolm Baldrige National Quality Award model and the EFQM model. The Deming model focuses solely on quality control related processes and is not readily employed in self-assessment practices. The MBNQA and EFQM models assess a wider range of business processes and criteria, and are widely employed in self-assessment initiatives. The two models are of similar nature, however, the main advantages of the EFQM over the MBNQA model are a stronger emphasis on environmental related issues, and the equal weight placed between the outputs (results) and the implementation qualifiers (enablers).

3.5 Conclusive Remarks

This Chapter has explored the literature that documents the fundamentals of Benchmarking, incorporating a review of Benchmarking principles, performance self-assessment processes and major assessment models.

Benchmarking was defined as a process of continuously measuring and comparing one's business processes against comparable processes in leading organisations to obtain information which will help the organisation identify and implement improvements. It involves an on-going investigation and learning experience that ensures the best industry practices are uncovered, analysed, adopted and implemented. The basic philosophy of Benchmarking is to provide a structured process to acquire and sustain competitive advantage by learning from superior performances.

The basis of a Benchmarking process is the assessment of enterprise performance, to identify opportunities for improvement and further development in comparison to other enterprises. The assessment provides the basis for comparison, both internally and externally, and provides a sense for direction as to what needs to be improved. Enterprise performance audits can be conducted either externally through independent auditors or internally through the use of self-assessment practices. Self-assessment allows organisations to discern clearly their strengths and areas in which improvements can be made and culminates in planned improvement actions, which are monitored for progress.

The assessment process can be conducted against internationally acclaimed performance assessment models such as the Deming Prize Model, the Malcolm Baldrige National Quality Award Model or the European Foundation for Quality Management Business Excellence Model. All the models were developed to assist enterprises in the ways of obtaining competitive advantage, and provide a framework for implementing a quality programme and establishing the benchmarks for measuring future progress. Self-assessment, using assessment models, facilitates Benchmarking in such a way that the two techniques are so interlinked as to be inseparable.

This chapter has provided a review and evaluation of Benchmarking principles, self-assessment models and Benchmarking practices available to Small and Medium-sized Enterprises, in accordance to the research objectives set in Chapter 1.

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Chapter 4: Benchmarking and Small and Medium-sized Enterprises

4.1 Synopsis

In this Chapter, the commonest definitions of Small and Medium-sized Enterprises are presented, their importance is assessed, their typical characteristics are outlined, and the difficulties in applying Benchmarking practices in SMEs are discussed. Finally, current SME focused Benchmarking initiatives and practices are evaluated and their effectiveness is assessed.

4.2 Definition

Small and Medium-sized Enterprises (SMEs) defy easy definition. In everyday life, the term small business is usually applied to small shops in the neighbourhood, while large companies are often regarded as the multinational giants (Barrow 1993).

The initial introduction of the Small and Medium-sized business concept in the United Kingdom economic terminology can be traced to the report of the Macmillan Committee on Finance and Industry published in 1933, in which the lack of long-term capital for SMEs was recognised. During the Second World War, it was recognised that the post-war restructuring of the industry would require the channelling of resources to the rebuilding of Small and Medium sized Enterprises. In 1959, the Radcliffe Committee recommended some improvements on the financial facilities available to small firms. Neither the Macmillan nor the Radcliffe reports attempted to define the small businesses they were referring to in their recommendations (Hertz 1982). Small companies were characterised by their difficulty or inability to raise risk capital from the public (Barrow 1993).

The first attempt to define Small and Medium Enterprises was in 1969, when a committee was set-up under the chairmanship of J.E. Bolton to consider the state of small firms in the United Kingdom economy, the facilities available to them, and to make recommendations. Their report, published in 1971, defined small businesses as those with a relatively small share of the market, managed by its owner and not being a subsidiary of a larger company. The quantitative limits were set to these companies employing less than 200 employees in the manufacturing sector, having an annual turnover of £50,000 pounds (in 1970 prices) sterling in retailing, and employing less than 25 employees in the construction industry (Barrow 1993).

The main difficulty encountered when creating unitary terminology is that while definitions are static in nature, the objects they describe can be dynamic and ever-changing (Hertz 1982). As small businesses operate in diverse political, legal, social and economical climates a unitary global definition will undoubtedly create contradictions.

The number of employees or the annual company turnover are usually employed to define an SME. In France, companies with less than 50 employees are classified as small enterprises, while medium-sized enterprises can have up to 500 employees. Companies with more than 500 employees are considered as large enterprises. In Denmark and Ireland, a small business employees less than 50 employees, a medium sized enterprise less than 200, and a large business employees more than 200 people (Barrow 1993).

Contradictions can be developed when considering a single criterion for the definition of Small and Medium Sized Enterprises. In 1992, Denmark had only 400 companies employing above 200 employees. If the large company definition would be above the 500-employee level, Denmark would have virtually no large businesses (Barrow 1993). The concept of the Small and Medium Enterprise varies somewhat from industry to industry and country to country.

The most satisfactory way of determining the nature of a company is to combine different criteria together. In the United Kingdom, the Companies Act of 1985 states that a small company must satisfy at least two of the following criteria (DTI 1998(a)):

- A turnover of not more than £2.8 million pounds sterling (approx. 4 million ECU's)
- A balance sheet total of not more than £1.4 million pounds sterling (approx. 2 million ECU's)
- Not more than 50 employees.

A medium sized company must satisfy at least two of the following criteria employees (DTI 1998(a)):

- A turnover of not more than £11.2 million pounds sterling (approx. 16 million ECU's)
- A balance sheet total of not more than £5.6 million pounds sterling (approx. 8 million ECU's)
- Not more than 250 employees.

Large enterprises are defined as the companies which control higher resources than those mentioned for the medium companies. For statistical purposes, the Department of Trade and Industry in the United Kingdom, defines a "micro" firm with a workforce between 0 and 9 employees, a small firm between 0 and49 employees (includes micro), a medium firm with 50 to 249 employees and a large firm with over 250 employees (DTI 1998(a)).

In March 1996, the European Commission adopted a single definition of SMEs shown in Table 3 (Commission 1996).

Criteria	Micro	Small	Medium
Max. number of employees	10	50	250
Max. annual turnover	-	7 M ECU's	40 M ECU's
Max. annual balance sheet total	-	5 M ECU's	27 M ECU's
Max. % owned by one, or jointly by several, enterprise(s) not satisfying the same criteria	-	25%	25%

Table 3: European Commission SME Definition

Member states, the European Investment Bank and the European Investment Fund were inverted to comply with the definition by the 31st of December 1997. The definition forwarded by the European Commission is adopted hereby in the thesis as the standard for the classification of companies. Enterprises employing more than 250 employees, with an annual turnover greater than 40 M ECU, or with an annual balance sheet greater than 25 M ECU, or owned by a large company by more than 25% are not within the domain of this research work.

4.3 Importance and Characteristics

The importance of Small and Medium-sized Enterprises is reflected by a report presented by the European Commission for the Madrid Council, which concluded that SMEs constitute 99.8% of all companies, provide 66% of total employment and attain 65% of business turnover in the European Union (EC 1995).

A statistical press release by the Department of Trade and Industry indicated that at the beginning of 1997 there were a total of 3.7 million businesses in the United Kingdom. Of the entire business population, only twenty five thousand were medium sized (50 to 249 employees) and only seven thousand were large (above 250 employees).

Figure 8 indicates the proportion of businesses, employment and turnover in Small, Medium and Large Enterprises in the United Kingdom at the start of 1997 (DTI 1998(a)).

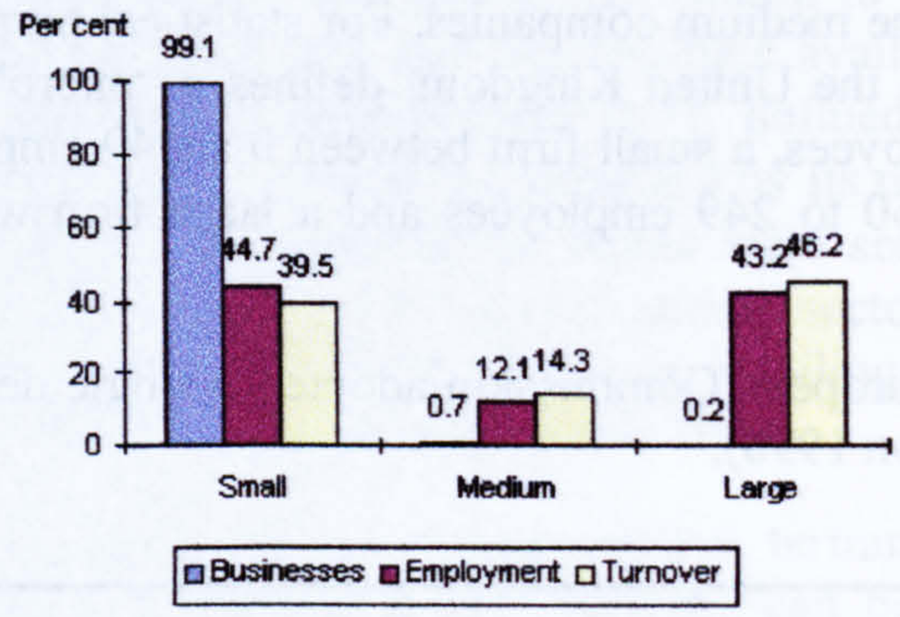

Figure 8: Proportion of Businesses, Employement and Turnover of UK Businesses

It is worth noting that companies below 50 employees constitute 99.1% of enterprises, employ 44.7% of the workforce and attain 39.5% of the UK turnover. Extending these figures to companies below 250 employees, it can be deduced that SMEs constitute 99.8% of UK businesses, employ 56.8% of the workforce and attain 53.8% of the overall business turnover.

In addition, Small and Medium Enterprises play a key role in terms of growth and generate an above average share of new jobs. The net job creation in SMEs has more than compensated for job losses during the period 1988 to 1995. Enterprises with fewer than 100 employees have been responsible for almost all the job creation at a rate of 259,000 net jobs per year, and this trend is expected to continue. During periods of economic recession, small enterprises shed jobs more slowly and absorb economic shocks better than larger companies (EC 1995).

Small and Medium Enterprises are the major contributors to supply chains. Ratcliff pronounces that the economy's strength is linked to the small manufacturing company strength (Ratcliff 1997).

It can be summarised that Small and Medium Enterprises are of major importance to the future European economy because (Cordis 1998):

- Their contribution to the creation and maintenance of employment, and in many regions of Europe they are the predominant providers of jobs and livelihood
- Their providing and accounting for a significant share of European Gross National Product (GNP), and are the principal sources of wealth creation in many parts of the Union
- Their occupying unique and strategic positions in the delivery chain, providing highly specialised niche products to large enterprises, as well as ensuring a diversity of supply of goods and services adapted to the needs of final customers.

Browne, Sackett and Wortmann emphasise that collectively the Small and Medium-sized Enterprises are assuming increased significance because (Browne, Sackett et al. 1994):

- Performance deficiencies in the SME sector threaten the United Kingdom overall competitive position; almost all product and service supply chain now comprise multiple SMEs
- Globalisation could significantly shrink the United Kingdom SME base. Most SMEs in open competition with world class, low cost producers will suffer contraction, employment loss and increased potential for business failure
- There is an opportunity for significantly increased value to be added from the United Kingdom Small and Medium-sized Enterprise resources; SMEs deploy a high proportion of the labour force and do not generate a corresponding proportion of the output
- New job opportunities are concentrated in the SME environment; raising SME manufacturing performance offers scope for employment growth.

Small and Medium sized Enterprises, especially in the manufacturing sector, have been recognised world-wide as increasingly important to the national well being (Sackett and Nelder 1995). However, the full potential for growth and employment within the Small and Medium Enterprise base is not being properly realised. On average 50% of SMEs in the EU fail within the first five years of their creation (EC 1995).

Table 4, indicates that Small and Medium-sized Enterprises form the absolute majority of companies in various industrial sectors (DTI 1998(a)).

Industrial Sector	Percentage SMEs
Agriculture, forestry & fishing	100 %
Mining/ quarrying	98.9 %
Manufacturing	99.2 %
Electricity, gas, water supply	83.7 %
Construction	100 %
Wholesale, retail & repairs	99.8 %
Hotels & restaurants	99.8 %
Transport, storage and communication	99.8 %
Financial intermediation	99.3 %
Real estate, renting & business activities	99.9 %
Education	99.9 %
Health/ Social work	99.7 %
Other community, social/ personal	99.9 %

Table 4: Percentage of SMEs by Industrial Sector

The high number of SMEs distributed in different industries and different markets signifies that the most striking and important characteristic is their diversity across sectors. Despite the heterogeneity in business motives, entrepreneurial styles, backgrounds and financial conditions, SMEs have a number of common characteristics (Nooteboom 1994).

Most of the smaller companies are family owned businesses, incorporating intertwined ownership and management. The manager-owner personality and their desire for

success influence the overall business operation, strategy and future direction. Only the minority of these managers have received formal training on business management.

SMEs are generally innovative, operate in small "niche" markets and customise their products and processes to respond to varying customer requests. They are usually product, not process orientated, and usually have a small production volume of non-complex products, using a few and simple manufacturing procedures (Barrow 1993). Complexity in the SME manufacturing environment can rise from the production of specialised products where scale effects do not appear (Nooteboom 1994).

They rarely employ formalised communication systems within the enterprise and internal information flows are based on oral communication. In contrast to larger companies, they do not have many levels in their organisational structure and have limited staff functionaries.

The typical weaknesses of SMEs are lack of time, financial and personnel resources, limited acquisition of new knowledge and usage of new technology, and concentration of activities into day-to-day management. Their limited resources make them sensitive to customer demands, competitive pressures and financial risks, and they often neglect the need for internal improvement by being engaged into day-to-day management to attain and maintain the required cash flow.

Small and Medium Enterprise characteristics may exist in the relatively independent subsidiaries of larger firms. In fact, large companies have started to search for the flexibility typical of small firms by "decentralisation", supplier networking and outsourcing (Nooteboom 1994).

4.4 Benchmarking and Small and Medium Enterprises

An extensive survey to report the levels of awareness, understanding and practice of Benchmarking, commissioned by the Department of Trade and Industry (DTI) and the Confederation of British Industry (CBI), was conducted between 1995 and 1997 amongst 6,250 targeted United Kingdom based enterprises (Anon(a) 1997).

The analysis showed that Benchmarking is practised by a rapidly reducing percentage of respondents in moving from the large to the small companies, Figure 9.

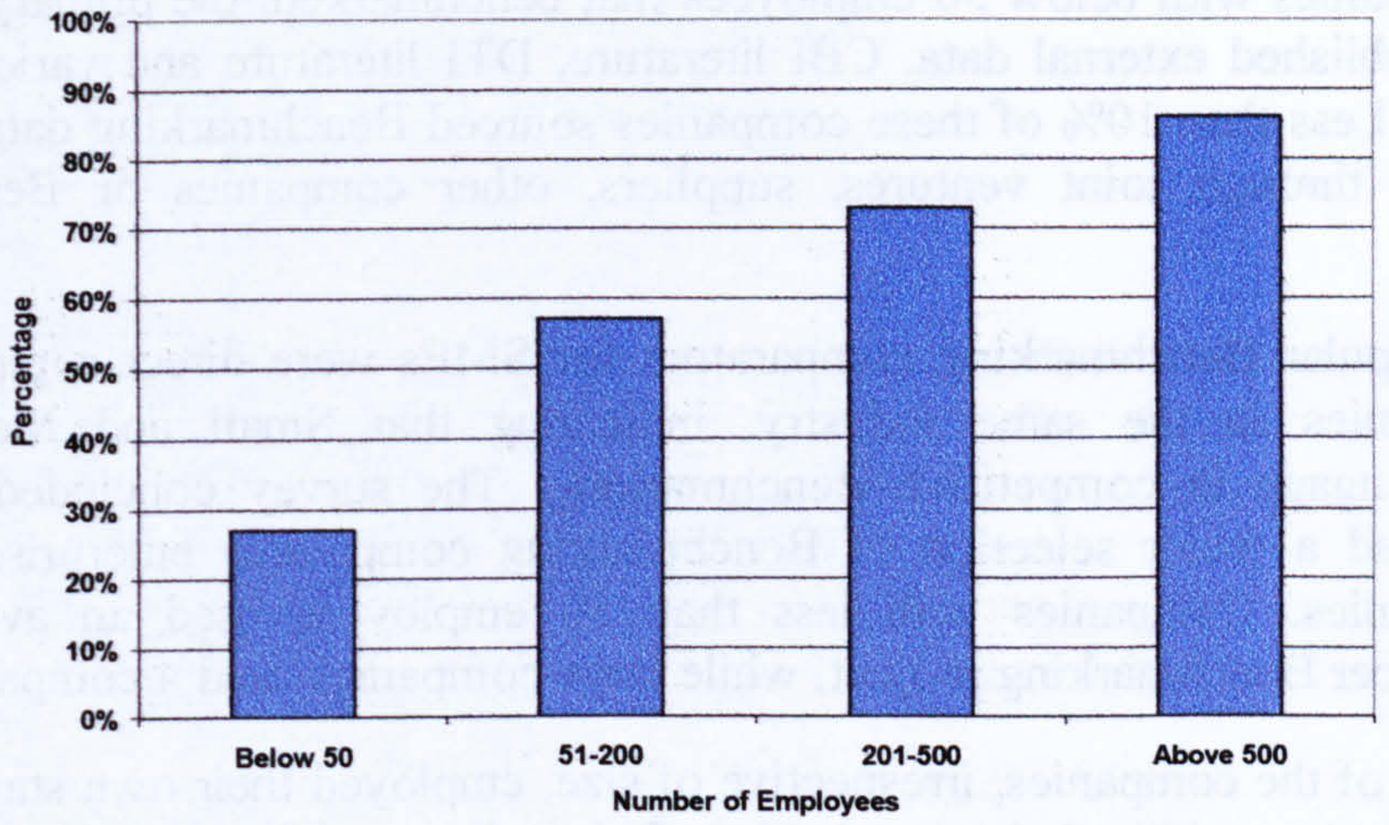

Figure 9: Percentage of Companies Using Formal Benchmarking Practices

Benchmarking is widely employed amongst large enterprises as 86% declared that they formally have engaged in a Benchmarking project. The percentage of Benchmarking practitioners decreases to 73% of the sample size for companies employing above 200 staff and to 53% for medium sized enterprises. The figure is significantly reduced when considering small sized enterprises employing less than 50 employees, since only 27% of the companies have been involved in a formal Benchmarking process.

An extensive survey conducted by the CIM Institute on nineteen Small and Medium-sized Enterprises demonstrate that only 32% of the participant companies benchmarked, and that the majority benchmarked against similar products or services (Dunn, Irgens et al. 1996). Although the sample size was small, the results agreed with a survey carried out by the University of Liverpool which found that 40% of the companies benchmarked (Taft 1992). Overall, the surveys indicate that a minority of SMEs engage in Benchmarking activities.

The DTI and CBI commissioned survey indicated that the level of awareness and understanding of Benchmarking varied by company size, Table 5 (Anon(a) 1997).

	Below 50 Employees	51 - 200 Employees	201 - 500 Employees	Above 500 Employees
Awareness Percentage	62%	93%	98%	99%
Awareness Period	1.6 Years	2.9 Years	4.3 years	5.3 years

Table 5: Awareness of Benchmarking Key Concepts

Almost all the large companies claimed awareness of the key concepts of Benchmarking for an average period of just above five years. Only 62% of the small companies claimed awareness of Benchmarking and for only an average period less than 2 years. Considering that the large majority of enterprises are on the small and medium scale, it is evident that the depth of Benchmarking activity is very poor.

For the companies with below 50 employees that benchmarked, the primary sources of data were published external data, CBI literature, DTI literature and various industry associations. Less than 10% of these companies sourced Benchmarking data from their peers, either through joint ventures, suppliers, other companies or Benchmarking groups.

The most popular Benchmarking comparators for SMEs were direct competitors and other companies in the same industry, indicating that Small and Medium-sized Enterprises engage in competitive Benchmarking. The survey concluded that large companies had a wider selection of Benchmarking comparator enterprises than the small companies. Companies with less than 50 employees used an average of 2 comparators per Benchmarking project, while large companies used 4 comparators.

The majority of the companies, irrespective of size, employed their own staff to collect Benchmarking data within their organisation. Only a few participants in the survey used management consultancies, market research agencies or Benchmarking associations. The merit of using external agencies is that the bias risk is minimised. Larger companies make more use of management consultancies and marker research agencies than smaller companies, this may be due to the limited financial resources for smaller companies . The author believes that the principal areas of difficulty most commonly encountered were:

- How to obtain meaningful, comparable data
- How to find the time and the resources and
- How to deal with resistance to change within the organisation.

These accounted for the majority of the difficulties mentioned in the survey, and were particularly encountered in smaller companies.

Therefore, the survey indicated that smaller companies tend to benchmark against their competitors, the source of data they use is mainly literature based, they use half the number of comparators than larger companies, and prefer to collect the data using their own employees. They exhibit difficulty in obtaining meaningful comparable data, allocating resources in the Benchmarking process and dealing with organisational change within their enterprise.

4.4.1 Barriers

"Too expensive" and "not enough time" are two of the most common reasons why small companies think they cannot afford Benchmarking (Micklewright 1993). Small and Medium-sized manufacturing enterprises can be left behind, operating in the same way and designing similar products as they always have. SMEs are typically put off by what they perceive to be a considerable effort involved (Dale 1996).

Owing to their small size, they have few highly skilled employees joining the company with knowledge of the latest tools, technologies or methods (Micklewright 1993). In

addition, they are mainly concerned and involved with day-to-day operations and rarely see beyond their immediate environs. They consider Benchmarking applicable only to larger companies. This is supported by the European Network for Advanced Performance Studies survey which showed that Benchmarking practices are directly proportional to company turnover: small companies did not tend to benchmark, while larger companies did (Dunn, Irgens et al. 1996). By definition, SMEs are closer to their customers and employees than larger companies. They have the advantage of a day-to-day informed view of their business from which managers in large business are relatively removed, but it also means that they find it harder to take a strategic view and to use information in a strategic way (Monkhouse 1995).

Another reason why Small and Medium-sized Manufacturing Enterprises do not co-operate in Benchmarking studies is that they have difficulty in looking beyond their immediate environs for Benchmarking partners and best practices (Skandalakis, Nelder et al. 1997). Consequently, false assumptions about best-practice can become embedded in a region, reducing the impetus for innovation and continuous improvement.

In general, Small and Medium Enterprises do not have the resources, the time, the knowledge required to implement Benchmarking initiatives, and experience difficulty in looking for partners and hence better practices in Benchmarking activities.

4.4.2 Applicability

In section 3.2.4, Benchmarking initiatives were classified as process, performance and strategic Benchmarking in accordance with the chosen benchmarks, and internal, competitive, functional and generic indicating the chosen competitor for the benchmarks. Andersen suggests that the highest potential for success can be attained through the combination of process Benchmarking with functional or generic Benchmarking (Andersen 1996).

Internal Benchmarking in SMEs is not very practical due to the small corporate employee base. In a Small and Medium Enterprise, internal Benchmarking offers a limited amount of comparative data. Traditionally, SMEs engage in competitive Benchmarking. They compare their activities against the best in their industry, and the average performance. However, this is mainly limited to financial or manufacturing related numerical data. It provides a good base of how competitive the company is positioned in terms of its performance, but gives very little indication of how to improve and learn from the best.

In the authors view, it is difficult to establish a successful competitive Benchmarking study or partnership between SMEs, as they are more prone to competitive threats than larger companies. They would not reveal their competitive advantage, hence the reason for their superior performance, to their competitors as this would be damaging for their business.

Functional Benchmarking has the potential to provide excellent opportunities for improvement, for Small and Medium Manufacturing Enterprises:

- It is not sector specific, and therefore it searches for best practice at every sector, anywhere in the world

- It does not possess the confidentiality limitations of competitive Benchmarking. The Benchmarking partner companies are from different industrial sectors and do not impose a threat on each other. They are willing to share knowledge on how superior performance is achieved. A successful example: Bosch-Siemens discovered how much it had in common with Bahlsen, a cookie factory (Versendaal 1997). Both companies engaged in a successful Benchmarking partnership

- It enables data maximisation since a Benchmarking partner and best practice can be identified in any industrial sector, at any physical location

- It can provide "out-of-the-box" best practices. In competitive Benchmarking, a best practice is obtained from a competitor. As a result, there will always be a lag in performance. Functional Benchmarking can provide a solution that will provide a competitive advantage for the company over its competitors.

Generic Benchmarking is beneficial only for comparing specific non-strategic business processes, which are identical between companies, such as customer order processing and packaging, and it is considered very specific, limited only to a small area of the business. Generic Benchmarking is a sub-set of functional Benchmarking (Camp 1989; Watson 1993).

Process Benchmarking is rarely implemented in small companies as it can become a resource intensive process. Many SMEs cannot afford to invest time and resources in initiatives such as Benchmarking, as they are not directly involved with the day-to-day management of the enterprise. Strategic Benchmarking is often done on an ad-hoc basis through the probable identification of a "niche market". Often small companies diversify their products and services without proper planning and market survey analysis. Denton and Hodgson note the degree of uncertainly and risk which may incur as a result of inadequate analysis or planning (Denton and Hodgson 1997).

The majority of smaller companies engage in performance Benchmarking to assess their competitive position in terms of the cost of their products or services, the delivery lead time and their product quality. The author, through his experience of conducting a Needs Analysis in Small and Medium Manufacturing Enterprises in the Bedfordshire area, identified that all of them were highly aware of their market position and their competitive advantages in terms of price, quality or delivery.

In summary, Small and Medium Enterprises engage in competitive performance Benchmarking. The challenge is to extend the application of Benchmarking in SMEs to functional process Benchmarking.

4.5 Initiatives

In this section, the most widely recognised and employed Benchmarking initiatives in the United Kingdom are outlined and assessed. They comprise of the Promoting Business Excellence (PROBE) Initiative, the UK Benchmarking Index, the Inside UK Enterprise (IUKE) Initiative, the Cranfield Best Factory Awards, the European Network for Advanced Performance Studies (ENAPS) and the British Quality Foundation ASSESS Rapidscore and Validscore.

4.5.1 PROBE

PROBE (Promoting Business Excellence) is a CBI National Manufacturing Council led initiative, which is building on a proven methodology developed by International Business Machines (IBM) and the London Business School. It comprises a database of over 1000 manufacturing sites in Europe, collected over a period of three years. The PROBE Initiative:

- Benchmarks performance and practice against other leading manufacturers
- Identifies areas for improvement
- Takes a maximum of two one-day sessions involving a cross-functional team
- Provides instant results, analysis and a final feedback report within one week
- Provides a database of more than 1,000 companies at an international level.

The database is growing continually with a strong international dimension provided through IBM's global operations and the involvement of a network of leading international business schools.

It is a simple three-stop process. First, through a facilitated self-assessment process it addresses key areas of manufacturing and engineering practice and performance by asking questions on organisation and culture, quality, cycle time, plant and equipment, business measurement and customer satisfaction. It then compares you with other sites in your sector and within European manufacturing, identifying strengths/weaknesses. Finally it helps, by intelligently sign-posting the areas where you can improve.

The team-based self-assessment takes approximately half a day to complete and enables you to analyse your operations against a practice/performance model. The methodology is influenced by the European Foundation for Quality Management Model Business Excellence, the American Malcolm Baldrige Analysis as well as drawing on leading edge Japanese lean production concepts.

The model looks at the component parts of world class excellence in:

- Total Quality
- Concurrent Engineering

- Lean Production
- Innovation and Product Development
- Manufacturing and Engineering Systems
- Logistics
- Company Organisation and Culture.

PROBE examines both the practices and the critical processes within a company. A trained PROBE facilitator visits the site, discusses the self-assessment conclusions with the company cross-functional team, processes and analyses the results and provides feedback on the findings using a performance chart. The company performance can be reviewed against sites within the same sector to provide a more in-depth analysis of the company's competitive position.

The PROBE initiative will highlight the strengths and weaknesses within the organisation, identify the factors which are crucial to the enterprise competitiveness and help prioritise areas for improvement.

The author found that PROBE aims to benchmark the participant company by positioning its performance on a grid and comparing it against other practices. It involves a combination of process and functional Benchmarking and is based on the EFQM Business Excellence Model. Throughout the Benchmarking process, there is no Knowledge Transfer from better performing companies or from superior practices to the benchmarked enterprise. In addition, another drawback of the PROBE initiative is that the database can easily get out of date, meaning that benchmarked companies can be comparing their current performance against outdated best practices.

4.5.2 The UK Benchmarking Index

The United Kingdom Benchmarking Index is the first truly national Benchmarking service specially designed for small firms, which has been developed for the Department of Trade and Industry. It is a simple, computer-based system that, through a series of questions, will allow a large range of different types of small firms to compare their performance in key areas such as finance and operations, business excellence and manufacturing with other companies in their sector or region. Its objective is to bring high quality Benchmarking information and advice within easy reach of SMEs.

Interested Small and Medium-sized Enterprises complete an assessment covering Financial, Management and Business Excellence measures. This information is then compared against the UK Benchmarking Index central database. Company performance can be compared locally, nationally, or for a particular sector. A report is then generated which analyses company performance in detail, focusing attention on areas of the company where there is room for improvement.

The Benchmarking process involves seven stages. At the first stage, the business advisor provides the interested company with the assessment questionnaire, which

comprises 80 questions. It has been designed to help an organisation assess its competitive position. It focuses on performance measures, which range from financial and operational areas through to the to following accepted factors of measuring business excellence using the EFQM Business Excellence Model. The second stage involves the data collection process. The company will work through the assessment by itself, without any involvement from the business advisor, who at the third stage will help clarify any queries, and validate the score through his experience. The fourth sage involves transmitting the completed questionnaire to the central database electronically to conduct the analysis and the Benchmarking process. Companies can select which Benchmarking criteria they would like to employ to assess and position their performance. Comparisons can be made on a regional or industrial sector basis, in turnover or number of employees

The fifth stage of the Benchmarking analysis comprises the automatic generation of a report showing comparisons of around 65 key business performance measures covering customer service, profitability, investment, financial management, productivity, growth, innovation, suppliers, people satisfaction, people management, and business excellence. The report is subsequently presented to the company, and reviewed by the business advisor, forming the sixth stage of the process.

An example of the type of Benchmarking comparisons done under the UK Benchmarking Index is shown in Figure 10. Companies which achieved a score of 100%in a given criteria are the top performers in the database.

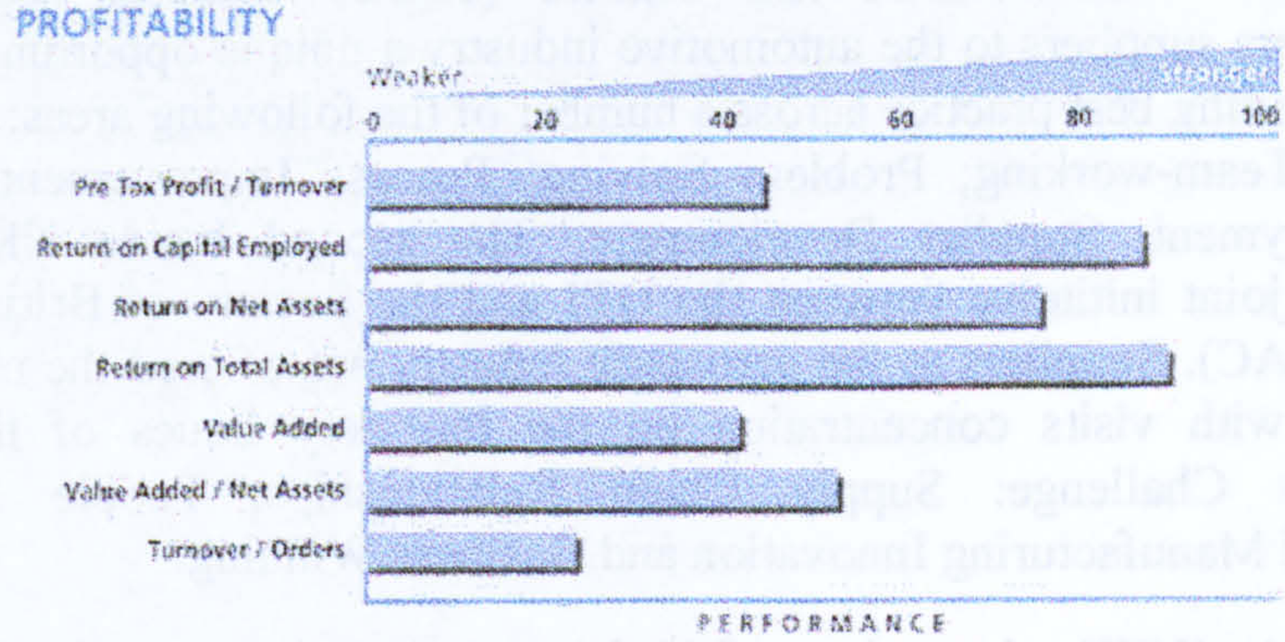

Figure 10: United Kingdom Benchmarking Index Sample Performance Graph

The last part involved developing an action plan for improvement with the assistance of the business advisor who will guide the company towards what services they can obtain from their local Business Link office.

The advantages of the Benchmarking Index are that it helps senior management teams assess and improve overall business performance. It provides comprehensive, quantifiable and objective performance information, and enables companies to compare themselves, easily. The Index highlights business strengths and weaknesses, identifying areas needing improvement. Working with Business Advisers provides opportunities to develop action plans to implement these improvements.

The disadvantages of the United Kingdom Benchmarking Index are similar to those of the PROBE initiative. There is no Knowledge Transfer between the better performing companies and the benchmarked enterprise in terms of how superior performance was attained. As the UK Benchmarking Index is based on a database, there is the danger that companies may be comparing their current performance against outdated best practices if the database gets dated.

4.5.3 Inside UK Enterprise

Established in 1988, Inside UK Enterprise (IUKE) is a major component in the Department of Trade and Industry's support for business and is endorsed by the Confederation of British Industry National Manufacturing Council. IUKE had a total of more than 150 companies nation-wide acting as hosts to industrial visits, each experienced in implementing and operating one or more aspects of best practice. The largest scheme of its type in the world, IUKE has to date clocked up nearly 25,000 one-day visits with over 5,000 visitors in 1996. Visitors can choose companies in relevant market sectors or areas of management expertise, where they can see a broad range of best practices in action. Specific sector programmes now exist for the Automotive and Aerospace industries.

The first Inside UK Enterprise-Automotive is a joint initiative between the DTI and the Society of Motor Manufacturers and Traders (SMMT) Industry Forum. IUKE-Automotive offers suppliers to the automotive industry a unique opportunity to visit 15 companies exhibiting best practice across a number of the following areas: New Product Development; Team-working; Problem Solving; Process Improvement; Policy and Strategy Deployment; Supplier Development. The second Inside UK Enterprise-Aerospace is a joint initiative between the DTI and the Society of British Aerospace Companies (SBAC). Suppliers to the aerospace industry are offered the chance to visit 19 companies with visits concentrating on the four key issues of the industry's Competitiveness Challenge: Supply Chain Relationships; People Management; Engineering and Manufacturing Innovation and Business Winning.

The essence of the IUKE scheme is twofold. It recognises that every business is under pressure to improve its competitiveness, which ranges over all aspects from quality and lead times to culture. It is committed to the view that facilitating practical experience and enabling business executives to have open discussions in small groups with their peers - provides the best form of accelerated learning.

There are six steps in the Inside UK Enterprise initiative. The first step involves setting the objectives and developing a business improvement programme. The second step is related to identifying possible visit topics. IUKE host companies are recognised for their achievement in one or more areas of best practice, which include: Teamworking and Empowerment, Change Management, Total Quality, Continuous Improvement, Cellular Manufacturing, Kanban, JIT and Supplier Relationships, Customer Care, New Product Introduction and Benchmarking using the Business Excellence Model.

At the third stage of the initiative a company selects the appropriate host to visit. There are 3 company categories: General Hosts, Automotive Hosts and Aerospace Hosts, and at the next two stages representatives complete the booking form and attend the visit. Each host company offers the opportunity to observe new principles and techniques, through presentations and plant tours. Discussion sessions provide the opportunity to question managers or shop floor staff. Hosts also provide information on the technology used to achieve best practice, this often includes CADCAM, bar coding, Kanban, processes, information systems and MRPII as well as specific technology to each company. The visits have a standard itinerary covering a presentation, site tour and discussion session. The sixth and final stage in the Inside UK Enterprise process involves establishing actions for improvement based on practices observed in the host or best practice company.

Inside UK Enterprise can be considered as informal Benchmarking. The company assesses its processes with the assistance of external auditors from the local Business Link office. Areas for improvement are identified and through the IUKE scheme, a source of better practice (Benchmarking partner) is selected. Superior performing practices are identified and better practice knowledge is informally transferred between the companies in an ad-hoc fashion.

The principal disadvantage of the IUKE initiative is the lack of quantitative data and the sole emphasis on qualitative information. Superior performance Knowledge Transfer can be limited or biased considering that qualitative data is open to individual interpretations. Participant companies might engage in "industrial tourism" where they visit the host company just to observe other plants, or engage in "feel good trips" where they solely compare their strengths to the host company, and no improvement initiatives are established in their business following the IUKE visit.

4.5.4 The Cranfield Best Factory Awards

Cranfield School of Management and Management Today have teamed up to provide a comprehensive award scheme to run across all industries and a free audit service which will help manufacturing plants to benchmark their performance against the highest industry standards in complete confidentiality.

The purpose of the Best Factory Awards Benchmarking service is to promote and reward manufacturing excellence in the UK against a background of growing international competition. Since 1992 overall over 1000 manufacturing plants have taken part in the awards.

All plants that participate in the awards receive a free, confidential and detailed individual Benchmarking report, containing more than 80 tables of comparative information, based on the selected award. An example of some Benchmarking data extracted from the engineering sector is shown in Table 6. The quantitative data has been provided by Cranfield School of Management and "Management Today" from the 1994 Best Factory Awards.

	Average performance	Top 25%	Top 10%	Company performance
Delivery reliability	87%	98%	100%	-
Ex-stock availability	91%	98%	98.50%	-
New product introduction over last 5 years (New Product/Product Range)	3%	15%	62%	-
Scrap rate	2.70%	0.50%	0.30%	-
Manufacturing added-value per manufacturing employee (000)	61	65	90	-
Total stockturns	9	11	18	-
Capacity used for changeovers	9.70%	3.30%	1%	-
Average component setup time (minutes)	84	16	10	-
Average assembly setup time (minutes)	25	5	2	-
Existing employees training days	5	8	10	-
New employees training days	12	20	28	-
Off-job training for existing employees	3	4	8	-
Rate of absenteeism	3.20%	2%	1%	-

Table 6: Engineering Sector Benchmarking Report

Awards are presented in companies within the engineering, electronics, process, household and general products industries, to the best Small Company (with below 500 employees) and the most improved factory. In addition there is the coveted overall Award: The Factory of the Year Award and the Judges Special Award.

The first stage of the evaluation is conducted through a self-administered audit questionnaire designed and managed to ensure complete confidentiality. The principal areas examined are purchase lead time, assembly lead time, component manufacturing lead time, set-up/changeover performance, cost efficiency, inventory control, labour productivity and delivery reliability. The best factories identified by this output are invited to participate in the second stage as prospective Best Factories, and are invited by a team of assessors from Management Today, the Confederation of British Industry, the Department of Trade and Industry and Cranfield University. The team meets with management and workforce on site to assess the plants competitive position. At this stage, key criteria include the quality of the management team and the degree of employee involvement. The category award winners will be chosen from the finalists.

The drawback of the Cranfield Best Factory Awards is that is beneficial mainly to larger companies, there is limited feedback on how to improve under-performing areas, and there is limited cross sector Benchmarking. The Benchmarking process is employed to position a company against other companies mainly in the same industry, and does not incorporate any superior performance knowledge exchange.

4.5.5 The European Network for Advanced Performance Studies

The European Network for Advanced Performance Studies (ENAPS) is being established by leading industrial and academic partners from 19 European Union and European Free Trade Agreement (EFTA) countries in recognition of the need to exchange knowledge across European industry.

ENAPS stands for European Network of Advanced Performance Studies. The objective of ENAPS is to collect and transfer knowledge about "best practices", and establish and run a network for performance studies across European industry. Composed of 10 partners, 25 agents and numerous clients, the network is submitting benchmarks for Performance Measurement to European industry as well as best practices with the aim to initiate improvement projects. The project is funded by the European Commission's ESPRIT programme under the project number 20888.

One of the basic ideas of the project is to establish a network throughout Europe to collect data from and for European Industry. Today from almost every country from Europe there is at least one member in ENAPS. The partners of the network are responsible for development of methods and tools as well as for setting up the network. The network will involve companies of all sizes, but will encourage the transfer of knowledge towards small and medium sized enterprises (SMEs). The network is intended to play a critical role in helping industry, government and educational leaders to appreciate and prepare for changes in work practices based on business process reengineering. Background information on ENAPS is provided in Appendix B.

The data collection process is limited to quantitative data, based on the ENAPS questionnaire, which consists of 94 metrics focusing on 8 processes and functions: *Accounts, Product Development, Marketing and Sales, Planning and Production, Customer Service, Procurement, Personnel and finally Other processes*. The metrics are subsequently employed to calculate the performance indicators, which are used as benchmarks. These are categorised into seven sections: *Enterprise Level, Product Development, Obtaining Customer Commitment, Order Fulfilment, Customer Service, Support and finally Evolution.*

Companies complete the questionnaire and submit it to the agent who calculates the performance indicators or benchmarks. The data is subsequently uploaded in a central database located in Germany to benchmark the company. Companies can be benchmarked against their own sector, number of employees, turnover, or against individual performance indicators. ENAPS has established an international Benchmarking methodology employed at 19 countries. Small and Medium-sized Enterprises based in the United Kingdom can benchmark their functions and processes against companies based in other European Countries and consequently use comparator companies outside their local environs.

The author found that the principal limitations of the ENAPS Benchmarking process are that data can get outdated after a period of time resulting in misleading query results for the participant companies, and no knowledge sourcing is attained from superior practices. Companies acquire a series of graphs, which position the enterprise's

performance against other companies. ENAPS incorporates similar disadvantages as other database based Benchmarking initiatives such as the UK Benchmarking Index, the Cranfield Best Factory Awards and PROBE.

4.5.6 British Quality Foundation ASSESS

As part of its mission to enhance the performance of all organisations in the UK, the British Quality Foundation has developed ASSESS which is divided into three software and paper based products to provide easy access to the knowledge and power of the EFQM Business Excellence Model, self-assessment and Benchmarking. ASSESS allows any organisation, whatever its size, structure or culture, to measure its performance against the EFQM Model and benchmark against other organisations regardless of sector or size.

ASSESS ValidScore is the most rigorous as the enterprise self-assessment is validated by experienced British Quality Foundation assessors who give an independent external perspective of your activities. The assessors or validators will analyse the completed assessment, visit your organisation to authenticate the results, and prepare a full report, which will help you to pinpoint areas which would benefit from improvement and change.

The ASSESS database is anonymous and contains examples of best practice from other enterprises and Benchmarking data can be attained for comparative and positioning purposes only. As in the previous Benchmarking tools and methodologies, ASSESS does not source any knowledge from the better performing companies, but solely uses the best scores to position an enterprise on a performance scale. The Benchmarking process can lead to deluding comparative results if the data becomes outdated, which is not the case for the self-assessment process which does not employ the database throughout the assessment process.

4.5.7. The SMMT/Bywater Benchmarking

The Society of Motor Manufacturing (SMMT) is an industry-led partnership involving many of the best-known names in the automotive industry. It aims to raise the sector's competitiveness by delivering shop-floor improvement programmes based on world-class best practice, led by expert engineers from major vehicle manufacturers.

The SMMT self-assessment package and diagnostic process is based on the EFQM Business Excellence Model. It is specifically designed as an easy to use, low cost and immediate mechanism for identifying areas of improvement potential. The assessment comprises of a questionnaire, involves 6-8 employees across all organisational levels, and takes 4 to 6 hours to complete. The questionnaire responses are stored on a disk, which is returned to Bywater to be assessed, and a report is returned to the participating enterprise. The report contains benchmarks against cumulative data from the enterprise's business sector (or cross sector), and contains comments on the strengths

and weaknesses for the five Enabler and four Results categories of the EFQM model. Finally it provides some generic recommendations on how the Enablers and the Results can be improved based on statistical analysis of the relevant impact of every sub-Enabler element on the results.

As with the previous Benchmarking initiatives, the SMMT/Bywater initiative is based on data accumulated by other enterprises over a period, leading to the danger of performing comparisons against out-dated data. Moreover, the recommendations provided to the enterprise relate to which areas of the Enablers they need to improve to achieve better Results, but does not provide information on specific actions required. The process has been extended to other industrial associations such as the Society of British Aerospace Companies (SBAC).

4.5.8 Summary

The common underlying problems of current Benchmarking initiatives available to Small and Medium-sized Enterprises are the lack of Knowledge Transfer on how superior performing companies attained better practices, and the danger of performing comparisons against outdated data. There is a lack of Benchmarking models and tools, which, upon assessment of an enterprise will provide information on how to improve, based on existent non-outdated Benchmarking data.

4.6 Conclusive Remarks

Small and Medium-sized Enterprises form a heterogeneous and significant economic force in industry. They have a great potential to create new jobs, generate economic growth and form the foundation elements of supply chains, as discussed in Section 4.3. They play an important role in innovation, but may have difficulties in accessing new technology, have limited financial, personnel and time resources, day-to-day management takes priority, and are sensitive to external pressures, which poses challenges to development. The importance of SMEs in the prosperity of a society and the recognition that they seem to underperform enhances the need to assist smaller companies improve their performance.

Benchmarking as a tool for improvement can be employed to enhance the competitiveness of smaller businesses, however, it has limited penetration or adoption in Small and Medium-sized Enterprises as discussed in Section 4.4. The principal reasons for the hesitance to adopt Benchmarking as an improvement process are: lack of awareness, time, knowledge, financial and personnel resources, emphasised by the consideration that it is applicable only to large enterprises, as discussed in Sections 4.4 and 4.4.1.

The impact of Benchmarking in SMEs is further minimised, considering that it is widely employed as a performance positioning tool rather than a performance

improvement methodology. A review of the major SME Benchmarking initiatives in the United Kingdom demonstrated that there is no knowledge or information sourced from superior performing companies on how better practices were attained. The review also indicated that Benchmarking analyses are based on data collected in the past, emphasising the danger of generating lapsed comparative conclusions through out-dated data. This chapter identified issues that Small and Medium-sized Enterprises face when they engage in a Benchmarking process, according to the research objectives set in Chapter 1.

The following Chapter outlines the requirements to establish a successful Benchmarking implementation in Small and Medium-sized Enterprises, aiming to minimise the Small and Medium Enterprise reluctance to engage in a Benchmarking activity.

Chapter 5: Knowledge Transfer

5.1 Synopsis

This Chapter considers a definition for knowledge, describes the connection between information, data and knowledge and outlines basic types of knowledge. The importance of knowledge and intellectual property in modern business economics is addressed, and the importance of inter firm Knowledge Transfer is outlined. Issues relating to inter-firm Knowledge Transfer process are discussed and a map of the desirable characteristics for Knowledge Transfer in Small and Medium-sized Enterprises is presented.

5.2 Definition

Knowledge is an abstract concept with infuriatingly vague vocabulary surrounding it. Terms such as, data, information, knowledge are often used interchangeably and without clear definitions.

Knowledge is based on data, which can be described as basic units of observation, measurement and structured into information. Data can be defined as (Oxford 1978):

> *"Data is something known or assumed as a fact, made basis of reasoning or calculation. Data is a perms from which inferences are drawn."*

Data forms a gathered body of facts, which when structured, organised, analysed or patterned can lead to information. The word information is derived from Latin *informare*, which means, "give form to". The etymology connotes an imposition of investigation and structure upon data. The Webster dictionary provides a definition for

information as the means of acquiring knowledge through an investigation (WWWebster 1998(b)):

> *"Information are news, advice, or knowledge, communicated by others or obtained by personal study and investigation."*

Information therefore leads or "gives form to" knowledge. Subsequently, knowledge can be defined as (Reber 1985):

> *"Knowledge is collectively the body of information possessed by a person or, by extension, a group of persons or a culture."*

Newman asserts that in business, the transition from information to knowledge is defined by an approach that begins with the context of what is known about the past and with a style of thinking about the future as a process that identifies opportunities for delivering competitive advantage. For example, the development of the Stealth fighter technology from a dense, Russian technical paper that predicted how to calculate stealth geometric configurations to control electromagnetic reflections (Newman 1997).

The concepts of "knowledge" and "information" and "data" are related, but not synonymous. Knowledge is dependent on information as information is dependent on data. The connection between data, information and knowledge has been considered by Drucker (Drucker 1993):

> *"The interpretations and understandings of information derived from data lead to knowledge."*

5.3 Types of Knowledge

Cognitive psychologists generally agree that there are two distinct types of human knowledge: declarative and procedural (Anderson 1983; Howard 1983; Jonassen, Beissner et al. 1993).

- **Declarative knowledge (knowing "that")** refers to the knowledge of truism. It consists of a propositional network only a small part of which is active at any one time. Declarative knowledge is also referred as factual knowledge, as it is based on facts (Reber 1985).

- **Procedural knowledge (knowing "how"): refers to knowledge about how to** perform various cognitive activities. It consists of a set of productions that correspond to strategies that specify what should be done if a given set of conditions become active. Procedural knowledge, also known as practical knowledge (Reber 1985), has two parts: a condition, which specifies a set of features, and an action which specifies a set of changes that will take place if the condition element is met.

Examples of declarative knowledge include the position of the gears in a car, or the declaration that canaries are yellow. An example of procedural knowledge is a system for crossing the street: "**IF** *Light is Red AND (state = want to cross the street)* **THEN** *Wait*". The conditional part of the procedure, incorporating two features, is "*Light is Red AND (state = want to cross the street)"*, and the action is *"Wait"* (Howard 1983).

Declarative refers to knowledge concerning facts, while propositional refers to knowledge about how to perform various cognitive activities. Procedural knowledge fundamentally has a problem solving nature (Anderson 1985). Chappell notes that declarative knowledge is the fundamental, factual knowledge of the system, its components, controls, and functions, while procedural knowledge is the rule-based knowledge about how to operate the system and to perform specific tasks (Chappell 1995).

Knowledge can also be characterised as **explicit** when it is directly and clearly specified, contained in manuals and procedures, and **implicit or tacit** *knowledge*, learned only by experience, and communicated only indirectly, through metaphor and analogy. Explicit is knowledge known to the individual, while implicit is buttressed by a long-term process beyond the individuals conscious decision-making (Spender 1996). The notion of tacit knowledge was first expounded by Polanui, who noted that the aim of a skilful performance is achieved by the observance of a set of rules which are not known as such to the person following them. An example of explicit or tacit knowledge is the production process, involving a predefined set of clearly specified procedures for the manufacture of the end product. An example of implicit knowledge is in riding a bicycle. No amount of reading and study in the physics and dynamics of the bicycle will enable a person to ride a bicycle immediately. Japanese management scholars, developing a contemporary frame of reference in firm management, has emphasised the importance of "tacit knowledge" (Nonaka 1988 1990).

Implicit (tacit) knowledge can lead to improvements, however, the translation of implicit to explicit knowledge can yield the maximum benefits for enterprises. Transfer of explicit "superior performance" involves transfer of a set of identifiable procedures, however, the translation of implicit "superior performance" to explicit knowledge may not be easily articulated as it is acquired through practical experience and observation rather than formal learning (Polanyi, 1966). The scope of the thesis relates to the establishment of a transfer framework for procedural Knowledge Transfer between Small and Medium-sized Enterprises, involving the transfer of explicit and the translation of implicit (tacit) to explicit where possible.

5.4 Knowledge in Business

Intellectual capital and therefore knowledge reflects the most valuable parts of many companies. The crux is that knowledge forms the principal source of competitive advantage for any enterprise regardless of size. Knowledge is the business as much as the customer is the business. Physical goods or services are only the vehicle for the exchange of customer purchasing-power against business knowledge. Business is a

human organisation, made or broken by the quality of its people, and knowledge is a specifically human resource (Drucker 1964).

Even in traditional manufacturing industries, apparently dominated by enormous investments in physical capital, knowledge based competition and the related need for effective intellectual capital management are an increasingly pressing reality. Business distinction comes from ability to use and capitalise on knowledge of various types, from scientific and technical to social, economic and managerial knowledge. It is only in respect to knowledge that a business can be distinct, and produce a product or a service that is highly valuable in the marketplace (Drucker 1964).

Drucker asserts that mankind has experienced a shift from the industrial society the information society and subsequently to the knowledge society. In the age of the *Knowledge Society,* knowledge economy replaces the production economy and knowledge becomes a new economic resource. The "means of production" are no longer materials, labour and financial resources, but knowledge. The application of knowledge to "production" creates new social groups in the "knowledge society": "knowledge workers", "knowledge professionals" and "knowledge managers". Knowledge workers own tools of knowledge. The new economic challenge is about productivity of knowledge work and of the knowledge worker (Drucker 1993). Knowledge society is more than information society, it is about the transformation of data into information, and information into knowledge, knowledge into action and action into wisdom.

Knowledge is vitally important to the upgrading, transformation and redeployment of core competencies which, arguably, form the basis of an enduring competitive advantage (Porter, 1990). Knowledge is critical to the transformation of resources and capabilities into dynamic core competencies (Leonard-Barton, 1995; Prahalad & Hamel, 1990).

Knowledge has become the most important factor of production, so managers must focus on its production, acquisition, movement, retention and application. Knowledge must be conceptualised as either labour skills or intellectual capital, hence becoming a private commodity (Spender 1996) leading to market differentiation. The collective ability to accumulate knowledge, and apply it to produce new knowledge, have underpinned development (Drucker 1993; Moralez-Gomez 1993). Lack of knowledge can imperil progress.

5.5 The SME Knowledge Deficit

A study carried out by the CIM Institute, Cranfield University, commissioned by the UK Department of Trade and Industry and the Engineering and Physical Sciences Research Department found that SMEs have little interest in preparing for change through education and training (Sackett and Nelder 1995). The study found that SMEs often have poor managerial and technical personnel resources. They suffer from a drain of experienced personnel. They are more likely to lose staff to larger companies than

they are to gain. The shortage of highly skilled people moving in to the sector isolates SMEs from an important source of knowledge and technology transfer. Further the movement of people out of SMEs reduces the incentive to train (Sackett and Nelder 1995). Perhaps not surprisingly, the survey found that SMEs prefer to invest in capital equipment rather than training and organisational change. Seen against this background, the finding that 20% of Managing Directors questioned, in a sample of 900, had received no formal management education and no previous management experience before taking their up their post is not surprising. The majority claimed on-the-job experience and some education, but no recent education.

Small companies and their management teams are disconnected from the knowledge economy, as only a small minority of managers have received recent formal training (Sackett and Nelder 1995). Moreover, SMEs tend to lack positive experiences of, and relationships with leading training and education establishments. Training is done on an ad-hoc basis especially in the enterprises incorporating below 50 employees, not only as a consequence of limited resources being available but also because of the fear of losing knowledgeable and experienced staff to larger companies (Nelder 1998). Small and Medium-sized Enterprises recognise the business performance benefits that follow from having educated and experienced staff in management positions, however, they have difficulty in finding and retaining such people. Their failure to develop their own staff is driven by a fear that upon completion of the training course, staff will move on to higher paid employment (Nelder 1998).

Smaller companies often fail to maintain coherence between continuous improvement and day-to-day management, which can imperil their sustainability and long term endurance in the business arena. SMEs experience a scarcity of new knowledge, and require a process to assist evolution, knowledge acquisition and management learning. An innovation study conducted by the Central Logistics Association for Supply Chain Partnerships (CLASP) in 1995 amongst SMEs based in Bedfordshire, United Kingdom, indicated that shortage of skilled staff reduces the impetus on innovation (Nelder 1998). Barrow (Barrow 1993) notes the lack of skills in the SME sector. SMEs are locked into a position where they have weak human resources and poor visibility of emerging threats, and consequently are extremely vulnerable. For economic development policy, there are clear attractions in seeking to improve the educational levels of managers and engineers. Managers with training and experience are much more open to new ideas and are more confident that they can use them to improve their business performance (Nelder 1988).

The SME drain of knowledge is noted in a study carried out by the CIM Institute, Cranfield University (Sackett and Nelder 1995), which found that small companies suffer from a drain of experienced personnel. They are more likely to lose staff to larger companies than they are to gain. The shortage of highly skilled people moving in to the sector isolates SMEs from an important source of knowledge and technology transfer (Sackett and Nelder 1995). The lack of knowledge in small enterprises is also noted by Denton and Hodgson, who elaborate that the majority of the SME workforce in the United Kingdom is under-qualified, which imperils the prospects of progress (Denton and Hodgson 1997). Nooteboom notes that Small Business Knowledge tends to be shallow, narrow and tacit. Nooteboom outlines that managers who employ tacit

knowledge in managing their business often rely on their undocumented experiences and usually fail to see some aspects of their business.

The Needs Analysis assessment of twelve SMEs, under the ADAPT-CORE Project (Appendix C), has also indicated that Small and Medium-sized Enterprises experience some difficulty in prioritising their shortfalls due to shallowness and narrowness of knowledge. The managing director of an imaging technology enterprise was taking people from the shop-floor to assist him on the development of new products. He did not take into account the disturbance caused in the manufacturing cell by the time delay caused as a result of his action, because of the costs incurred were indirect and not accounted for. Similarly a cosmetics enterprise was opening packaged nail-varnish display sets held in the final product storage area, to remove a specific colour for a customer order. Rather than addressing the production process, the managing director destroyed the packaging and the display of finished products without thinking of the indirect costs of re-packaging. Shallowness and Narrowness of knowledge prevents SME managers from applying explicit and non-subjective knowledge in the management of their business (Nooteboom 1994), and subsequently can imperil business improvement.

The benefits of finding out how well the best enterprises are performing often provides improvement ideas that can help an organisation to improve its performance (Balm, 1996). Zairi and Hutton note that learning about best practices through benchmarking ensures that continuous improvement is turned towards achieving higher standards of competitiveness, and moves an organisation from continuos improvement to continuous learning (Zairi and Hutton 1995). Through the Needs Analysis of the ADAPT-CORE project, the author identified a lack of knowledge for performance standards. Enterprises often requested information on what are the most successful practices that the author has identified in other enterprises. Typical areas of interest were production control, warehouse keeping, personnel motivation, marketing and customer loyalty. The success of CLASP denoted the importance that SMEs place on superior performance practice sourcing. CLASP received some start-up funding from the UK Government, but at present, it is fully independent and funded by subscription. It provides services to member enterprises through a series of events, sub-groups and an Internet website. For many of its members, CLASP has become the preferred source for advice on best practices, helping them to learn about superior performance standards and how they can be achieved.

The success of national and international benchmarking organisations, clubs and networks outline the need for identification of sources for better practices. Organisations offering benchmarking activities in Europe include the Austrian Foundation for Quality Management (AFQM), the Benchmarking Centre, the Best Practice Division at the UK Department of Trade and Industry, the European Foundation for Quality Management (EFQM), the Swedish Institute of Quality (SIQ), the Fraunhofer Institut Information Zentrum benchmarking (IZB). At an international level, organisations offering information concerning best practices include the American productivity and Quality Centre / International benchmarking Clearinghouse (APQC/IBC), the Australian Best Practices Documentation programme, the Benchmarking Exchange (TBE), the Benchmarking Network inc. and the Quality Network. Special networks have also been established with the aim of exchanging information concerning superior performance

practices. Such centres include the Global Benchmarking Network (GBN), the World Class Standards Network (WCSN) and the Benchmarking Network service. Moreover, certain benchmarking clubs have been established to provide enterprises with information on superior practices, on a membership basis. Benchmarking clubs include The Paris Benchmarking Club, The Best Practice Club, and the Benchmarking Club Italy. Benchmarking organisations have also established membership based benchmarking clubs for their client enterprises. The Benchmarking organisations, networks and clubs are regarded as a source for superior practices (Keegan, 1998). Companies use the services offered at the benchmarking organisations to learn about better practices. Malsen and Platts, state that most companies have poor knowledge of best practices in other enterprises (Malsen and Platts 1997). Companies are not aware of performance standards achieved by other enterprises, and are eager to find sources for better practices.

Monkhouse notes that Small and Medium-sized Enterprises require access to a range of techniques proven to be successfully flexible to cope with their idiosyncrasies (Monkhouse 1995). She undertook in-depth interviews with SME managers and found that the large majority noted an unawareness of available tools to help them understand the relative flexibility of their organisations. Managers did not know where to find tools to assist them improve their enterprises.

The majority of the enterprises that participated in the ADAPT-CORE Needs Analysis identified that the immediate and mostly used source for better practices were companies within their immediate environs. Only two of the twelve enterprises frequently participated in events organised by the local Business Links and business breakfast sessions organised by Cranfield University to disseminate better practices. The managing director of an imaging technology enterprise noted that often ideas on how to improve certain areas of his business came from informal discussions at public houses with friends who also manage their own businesses. This was also noted by the managing director of a foam based sports equipment manufacturer, who sourced better practices from his brother in law who was employed in another enterprise. None of the participant SMEs had the resources, or the expertise required to invest in searching, and identifying better practices at a regional, national or international level. Small enterprises required assistance in acquiring superior performance practices, which justify the success of initiatives such as the CLASP network, Benchmarking centres, clubs and networks. Companies can obtain information on superior practices and obtain benchmarking data through their membership at such networks.

Cohen and Levinthal argue that organisations need prior knowledge, to assimilate and use new knowledge(Cohen and Levinthal 1990). The existence of a shallow and narrow knowledge base may imperil improvement, as managers might not take full advantage of superior practice knowledge to improve their business performance.

To capture the nature of the lack of knowledge in SMEs, the ADAPT-CORE team in Cranfield University conceived the SME Knowledge Deficit, which was identified as:

- *The difficulty in identifying and prioritising the most critical shortfalls in their knowledge.* Enterprises often require external assistance in defining deficiencies owing to the existence of a shallow, narrow and tacit knowledge base.

- *The unawareness of the performance standards of noteworthy successful businesses.* They are often unaware of superior performance practices developed in other enterprises and are usually restricted within their immediate environs for their search for better practices.

- *Not knowing where and how to acquire practices that can lead to superior performance.* Typical difficulties in acquiring supporting knowledge on how superior performance practices were achieved in other enterprises can be: enterprise resource constraints, difficulty in identifying the source of knowledge, and entanglement in the selection of appropriate knowledge.

- *The difficulty of using superior practices to good effect.* Business leaders with limited training often experience difficulty in adopting and adapting better practices internally within their business to their benefit.

5.6 Knowledge Transfer

In this section, issues concerning Knowledge Transfer will be discussed.

5.6.1 Realisation

The generation of knowledge enables an organisation to go through a process of organisational self-renewal and to expand its boundaries (Richter and Vettel 1995). Argyris and Shon argue that organisational learning and knowledge acquisition is a necessary mechnaism for the evolution of the firm (Argyris and Schon 1978).

The motives for the formation of inter-enterprise alliances for Knowledge Transfer include the need to spread the costs and risks of innovation (Mowery, Oxley et al. 1996). Through sharing of better practices, enterprises can obtain knowledge that lead to superior performance in other enterprises. Better practice sharing decreases the learning curve for intra-firm improvement activities, imposing less strain on the financial and labour resources. Another potential motive and benefit from the formation of knowledge sharing ventures is the fostering of relationships with other enterprises (Appleyard 1996). Knowledge sharing can be employed by enterprises as a testing ground for more extensive co-operation such as the establishment of strategic alliances or joint ventures.

One of the most widely cited motives for collaboration, linked to the need of obtaining innovative knowledge, is the acquisition of new skills (technical and managerial) from partner firms (Mowery, Oxley et al. 1996). Companies collaborate to exchange knowledge and learn from each other. This is common in the establishment of strategic alliances and joint ventures where, enterprises are in reciprocal competitive relation of knowledge growth, and aim to extract knowledge from their counterpart, to internalise it

and develop their own competitive base (Richter and Vettel 1995). Consequently, Knowledge Transfer involves co-operation between participant enterprises.

Knowledge sharing decisions are made by firms that possess the knowledge, on a basis of anticipated costs and benefits. Before entering in a co-operative relationship, enterprises possess internal knowledge, which they have been developing and generating. Internal knowledge includes information on products, processes and markets, as well as perceptions of cultural behaviour, which is always tacit (Richter and Vettel 1995). When enterprises divulge their knowledge to other enterprises, they release the knowledge monopoly, which may affect their competitive advantage. Therefore, there is a need for the Knowledge Transfer process to occur in a controlled environment, Figure 11.

To limit the possibility of data misuse, companies taking part in Benchmarking activities often prefer to sign inter-enterprise agreements and conform to a written Code-of-Conduct to have more control of the Knowledge Transfer process.

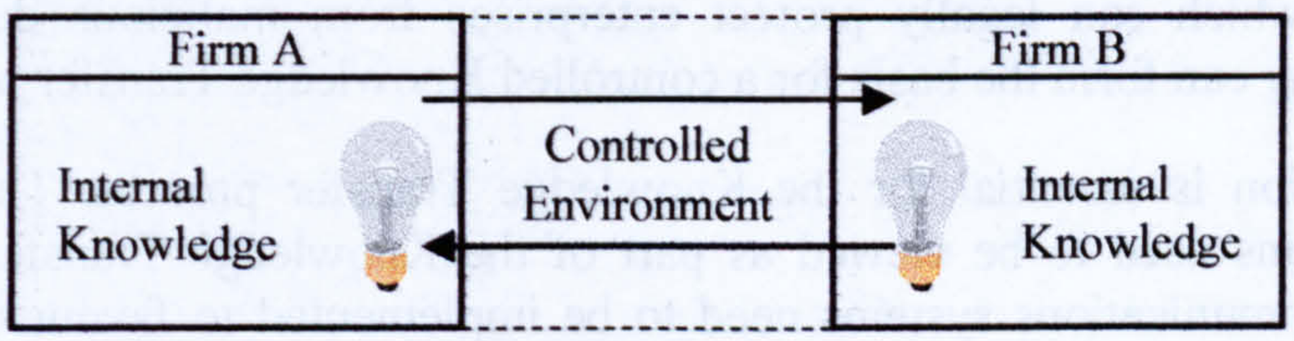

Figure 11: Essence of Control for Knowledge Transfer

Appleyard notes the primary mechanisms of inter-firm knowledge exchange in terms of access and use of shared knowledge (Appleyard 1996). She asserts that there are four categories of knowledge sharing mechanisms, developed through the combinations of restricted and unrestricted use of knowledge and private and public access to knowledge, and that Benchmarking studies are characterised by restricted use of knowledge and private access, Figure 12.

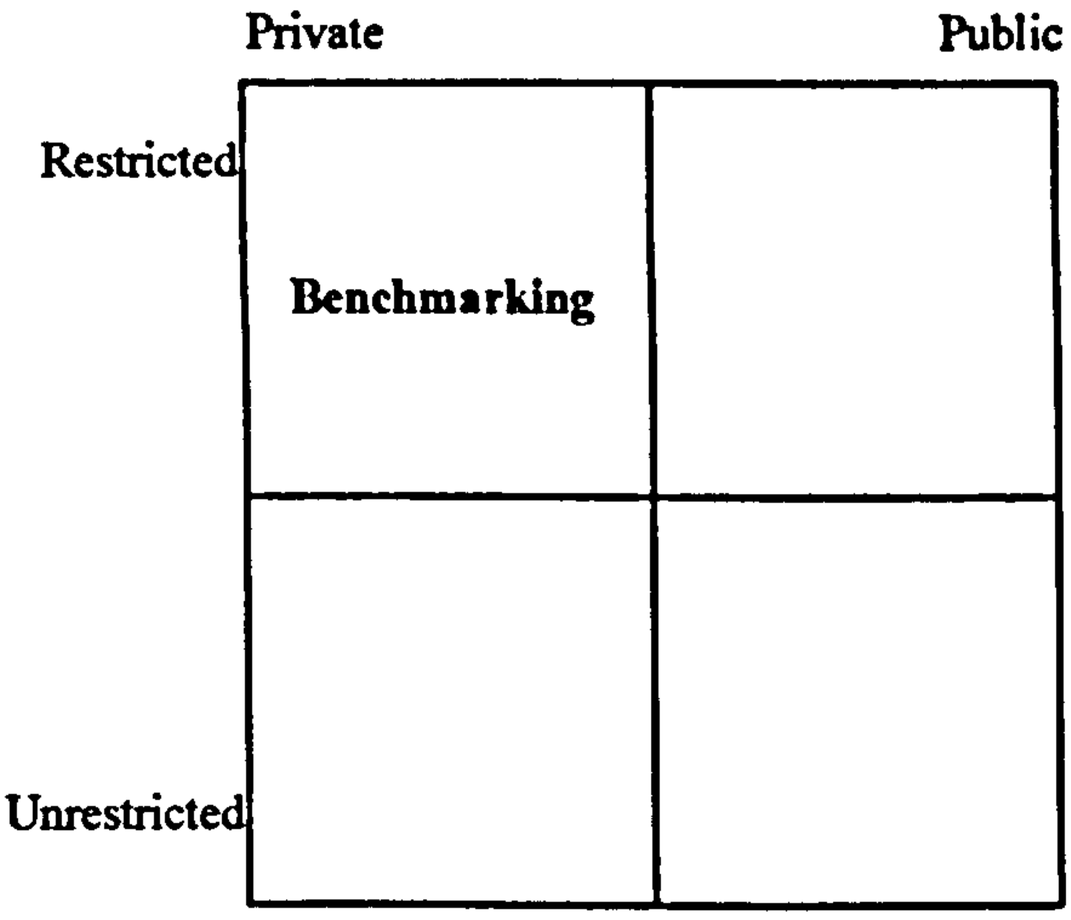

Figure 12: The Appleyard Knowledge Classification

Companies that participate in a Benchmarking study only gain access to information provided by other participant enterprises, the process can be restricted by use of a code of conduct which can legally protect enterprises from malicious damage. Overall, Benchmarking can form the basis for a controlled Knowledge Transfer process.

Communication is essential for the Knowledge Transfer process. The planning and control systems need to be viewed as part of the Knowledge Transfer process and a series of communications systems need to be implemented to favour the exchange of knowledge (Chiesa, Coughlan et al. 1996). This is also supported by Richter, who notes that the acquired knowledge needs to be distributed through a network of carefully set-up communication channels, acting as an information-gathering unit (Richter and Vettel 1995). Regular communication and personal acquaintances have been proposed as mechanisms for transfer of knowledge (Darr, Argote et al. 1995).

Huberman et. al. note the need of a "broker or knowledge linker" (Huberman, Levinson et al. 1981) who will transfer the knowledge. Richter notes that the process requires a champion who is responsible for the protection of the learning success, as well as expert guidance to guarantee operational conversion (Richter and Vettel 1995). This role can be upheld between enterprises by an independent agent or external consultant who will be responsible for the acquisition, management and dissemination of knowledge amongst firms. Furthermore, the same role can be upheld inside each enterprise by a process champion who will be responsible for the acquisition, management and dissemination of knowledge within the organisational boundaries. Each individual taking part in the process is expected to become culturally sensitised and develop receptivity potential for ongoing organisational changes. This will enhance the "absorptive capacity", that is the ability of a company to learn from its partners (Mowery, Oxley et al. 1996).

Zairi lists the criteria for the establishment of successful Best Practice sharing, and subsequently Knowledge Transfer (Zairi, 1998), sourced from ACA News, September 1995. The Critical Factors of Success have been listed primarily for internal Best Practice Sharing within enterprises, but can be employed from cross-boundary Knowledge Transfer.

The factors emphasise:

- Trust
- The ability to communicate clearly and with enough bandwidth to transfer meaning
- A common context or language
- A reason or goal for sharing
- The space to think and reflect
- The ability to interact with others in a non-purposeful way
- The autonomy to share
- Local knowledge that can be transferred easily
- A control and command structure that supports knowledge sharing
- The infrastructure to support learning.

Communication and control for the Knowledge Transfer process are of prime importance. Given the different way in which knowledge and skills are formed, organised and utilised in different societal settings, its degree of "tacitness" and ease of transfer may differ. Incompatibility in the knowledge structures and work systems between partner firms can generate many conflicts and difficulties in joint work. The different degree of tacitness of knowledge can also cause asymmetry in Knowledge Transfer (Lam 1997). Therefore, a high level of planning and control system, combined with a well organised communication system, is required to be in place to assist the conversion of tacit (implicit) to explicit knowledge.

5.6.2 Knowledge Transfer and Information Technology

Knowledge transfer involves communication. In the early stages of mankind's social evolution, gestures and speech were used to communicate knowledge. Subsequently, the transitory medium of speech was augmented with more durable kinds of knowledge representation including paintings, pictorial hieroglyphics and the written word. Consequently with this growth of techniques for communication, mankind was developing methods for routine manipulation of knowledge to augment his ability to think (Frost 1986). The use of Information Systems has established new opportunities for Knowledge Transfer and representation. Expert Systems have sourced and represented knowledge extracted from experts, to re-apply that knowledge when requested. Expert systems provide the means of transferring knowledge from an expert to a practitioner, through the use of Information Technology.

There are four important issues when using Artificial Intelligence and Information Technology to transfer and apply knowledge (Roy 1999). The first involves Knowledge Acquisition (the capture of knowledge), the second involves Knowledge Representation (the codification of knowledge), the third involves Knowledge Storage (storing knowledge for access), and the final stage is related to Knowledge Retrieval.

5.6.2.1 Knowledge Acquisition

Knowledge Acquisition prevails any stage of the design of a Knowledge Based System (Hart 1992), as it involves gathering knowledge related to a specific domain, problem or issue. The most widely employed methodology for acquiring knowledge is through recognised experts in the knowledge domain. Waterman notes that this process usually consists of a prolonged series of intense, systematic interviews, usually extending over a period of many months.

Additional sources for Knowledge Acquisition include textbooks, published materials in conferences or journals, manuals or case studies can be employed to source Knowledge. However, publicly available material may not often describe an experts knowledge to the required depth, but are a good source for general terms of reference, definition of terms to the subject area, and description of routine or common procedures (Hart 1992).

Knight notes that both procedural and descriptive types of knowledge can be sourced at this stage (Knight 1991), and can include concepts, procedures, models or heuristics that can be used in problem solving and inference systems. It is necessary that the Knowledge Acquisition stage covers as thoroughly as possible the selected knowledge domain or problem area (Roy et. al. 1996).

5.6.2.2 Knowledge Representation

The nest stage in the process involves establishing and employing certain rules to encode knowledge (Knight 1991). Over the years, a number of knowledge representation models have been developed. These models have used several diverse approaches to the problem of representing knowledge but have two common characteristics (Baur and Pigford 1990):

- Each model can be programmed with one or more computer languages or expert systems shells and the results stored in computer memory
- The models are designed so that their contents (facts or other types of knowledge) can be used in a reasoning process

According to the type of knowledge used, the Knowledge Representation model can be either declarative or procedural. Declarative models can include semantic networks, frames and predicate calculus (predicate logic), while procedural models can be based on production rules. It may be helpful to think of each model as a data structure that can be manipulated in search and pattern-making activities (Baur and Pigford 1990).

Production rules are the most popular form of Knowledge Representation in expert systems, as rules are relatively easy to understand and create. Rules are a good way to represent recommendations, directives or strategies when the knowledge to be represented consists of the results of practical experience in solving problems in a particular domain or knowledge area. The basic structure for a rule is (Black 1986; Baur and Pigford 1990; Waterman 1985): "IF conjunction of propositions THEN proposition". For example, the implication: "IF the pallet has 24 boxes THEN move to

dispatch". The rule captures the knowledge that a pallet cannot be moved to dispatch unless it has 24 boxes.

Semantic network, frames and predicate logic are techniques that are employed to represent declarative knowledge. A semantic network is based on a network structure and is usually viewed by graphic means. The semantic network, also called semantic net, is described by points (nodes) connected by direct links (arcs) that show hierarchical tree relations between nodes (Baur and Pigford 1990). Sub-nodes inherit all properties of the parent node (Black 1986). Frames is another technique of representing declarative knowledge. They are employed to organise knowledge that is common or relevant to a concept, object or situation (Baur and Pigford 1990). The frame consists of a name and has a set of attribute which characterise the name. An example of a frame is a national identity card, or a passport.

Another method of representing declarative knowledge is predicate logic or predicate calculus which allows a proposition to be broken down into two basic parts: argument (objects) and predicates (assertions or characteristics of an object) (Baur and Pigford 1990). For example, the statement "*Alexandros is Greek*" is presented using predicate calculus as: "*Greek(Alexandros)*". In this example, "Greek" is the predicate, while Alexandros is the argument.

The purpose of Knowledge Representation is to establish a Knowledge Base that can adequately cover the knowledge space.

5.6.2.3 Knowledge Storage

The output of the Knowledge Representation stage is the knowledge Base, which consists of a set of rules that were developed to encode knowledge as discussed in Section 5.6.1. The rules can be stored in a database system which will be employed for information and knowledge retrieval.

5.6.2.4 Knowledge Retrieval

Once knowledge has been sourced and acquired from the experts, encoded into a rule based format and stored in a database, it can be queried to provide knowledge or expertise. This is done through the "inference engine". The purpose of the inference engine is to move from an initial state (problem) to a goal state (solution). Knowledge Retrieval is usually based on deductive logic using the rules established at the Knowledge Representation stage. This is done under the assumption that the rules in the Knowledge Base are valid (Baur and Pigford 1990).

Inference engines operate using two methodologies: forward or backward chaining. Forward chaining starts from the initial conditions and uses the rules to provide conclusions, while backward chaining starts from the goal state and aims to identify the initial conditions. For example, if a buyer wants to identify the car with the lowest mileage, then the goal state (solution) is set to "lowest mileage" and the problem becomes "which car". Forward chaining would start from the cars and compare their

mileage's to identify the car with the lowest mileage. Backward chaining would start from the lowest mileage and would identify which car is associated with it.

Some Knowledge Based Systems incorporate Confidence Factors (CNF), to quantify the confidence in the results obtained from the set of rules (Knowledge base). Confidence Factors are whole numbers ranging from 0% to 100%. A Confidence Factor of 0% indicates no confidence in the result, while a factor of 100% indicates there is no doubt about the result (Baur and Pigford 1990).

5.6.2.5 Expert Systems

Knowledge Based Expert Systems have a wide range of applications. Waterman notes that they are employed in agriculture, chemistry, computer systems, the electronics industry, the engineering environment, in geology, information management, law, in various areas of manufacturing, in mathematics, medicine, meteorology, the military science, in physics, process control and space technology (Waterman 1985). Experts systems demonstrate that knowledge is transferable.

5.6.3 Knowledge Importation

There are many examples in the literature concerning cross enterprise superior practice transfer and idea importation. Camp, describes how a large multi-national enterprise transferred superior practices which led to business improvement from a smaller-sized Enterprise (Camp 1989). He describes that Xerox identified that they wanted to improve their warehousing and materials handling with special attention on the picking operations. The company contacted enterprises specialising in logistics but the most suitable comparator enterprise was identified as LL Bean, a clothing wholesaler. Camp notes that to the layperson, LL Bean's warehouse operation would not seem to resemble that of a multi-national manufacturer of packaged products. However, the analogy was striking as both companies had to develop warehousing and materials-handling processes and supporting systems to handle products diverse in size, shape and weight. Xerox identified that the performance measurement metrics were substantially higher at LL Bean, and subsequently Xerox redesigned their warehouses and incorporated some of the superior practices identified at L.L Bean and the results were pervasive (Camp 1989).

The CEO of a Midwest hospital in the United States borrowed an idea she heard on a Minnesota Public Radio and creatively adopted it to improve operations in her hospital. The radio reported on a process for public green space beautification. To overcome the persistent problem of litter strewn islands on public streets, the council encouraged people to assume ownership for keeping clean the public green areas in their neighbourhood. Bogan and English report that the programme had a felicitous effect. In this programme, the hospital's CEO found the solution for a nagging problem in the hospital. Common areas such as hallways and patient waiting rooms lay in no particular department's jurisdiction. Consequently, they became littered, with no hospital employee initiating immediate cleanup. These areas were often the ones most visible to

patients and their families. Through the adaptation of the Minnesota council green-space programme, the CEO improved the conditions for both employees and patients experiences (Bogan and English 1994).

Small companies tend to be especially skilful at idea importation from other enterprises. Starved of resources, they naturally develop a beg and borrow culture and creatively imitate to leverage others experiences (Bogan and English 1994).

Bosch-Siemens, a household appliances company, wanted to improve the storage and distribution of their appliances. Determined to reduce storage and shipping costs, the company analysed their weaknesses and decided to benchmark their processes against other enterprises. The company contacted their principal competitors (AEG and Electrolux), and it was not surprise to them that these companies showed little interest in sharing their logistics expertise. The solution came through a cookie and confectionery company named Bahlsen. Bosch-Siemens found that the monetary value per cubic meter of packed household appliances was very similar to that of cookies, cakes and snack foods. Their weight was also similar as refrigerators, mixers and dryers weighed an average of 130 kilograms while snack foods came in at 115 kilograms. All of a sudden refrigerators and cookies were interchangeable products. As a result from their co-operation, Bosch implemented an annualised hour scheme, and implemented electronic data processing systems to minimise the use of their slow and tedious paper-based commission system in their warehouse (Versendaal 1997).

The president of an SME contract manufacturer based in Westborough in Massachusetts, USA, noted that site visits were conducted in the spirit of friendly piracy. The company often visited other sites and held hosts visits for other enterprises, to obtain information on superior performances or ideas that could lead to improvements. In a similar manner, the managing director of a Manco, a Small and Medium-sized duct tape manufacturer in the United States believes that the study of excellent and superior performing enterprises, provide the baseline for the identification of excellent ideas, which can lead to business improvement. The company uses public-domain sources to identify and adapt highly effective ideas and operating improvements, such as books, articles, annual reports and other public information sources. The company quotes Socrates: "One thing only I know, and that is that I know nothing", and has created a continuous learning environment (Bogan and English 1994).

Examples of other large multi-national corporations that benefited from the search and identification for superior practices through Benchmarking include Milliken, Ford, Shell and BP, TNT UK, Virgin Atlantic Airways, Emirates Airways, Boots the Chemist, the Ritz-Carlton Hotel Company, AT&T, just to mention but a few (Camp 1995, Camp 1998; Bogan and English 1994; Bendell et. al. 1998; Finnigan 1996).

The literature suggests that the transfer of other company experiences, identified through Benchmarking, can become a powerful catalyst for learning and improvement.

The success of the Knowledge Importation case studies presented above, and in Section 3.2, rely on an element of luck concerning the identification of the superior performance and its source at different industrial sectors. Through the development of a Knowledge Transfer Framework, the author aims to decrease the element of luck in identifying a suitable cross-industrial sector benchmarking partner.

5.6.4 Knowledge Management

Drucker notes that "knowledge has become the key economic resource and the dominant source of comparative advantage" (Drucker 1998) This meant that the issue of managing knowledge is a imperative in gaining sustainable competitive advantage. Snowden defined knowledge management as: "the identification, optimisation and active management of intellectual assets, either in the form of explicit knowledge held in artefacts or as tacit knowledge possessed by individuals or communities. The active management of intellectual assets is the creation of management processes and infrastructure to bring together artefacts and communities in a common ecology that will sustain the creation, utilisation and retention of intellectual capital" (Snowden 1997).

Ruggles argued that "it is an approach to adding or creating value by more actively leveraging the know-how, experience, and judgement resident within and, in many cases, outside of an organisation" (Ruggles 1998). Leveraging knowledge can lead to a multitude of benefits, including faster innovation of new products, reduced duplication of efforts, savings in research and development cost, and enhanced employee satisfaction. Adesola notes that Knowledge Management is the broad process of locating, organising, transferring, and using the information and expertise within an organisation (Adesola 1998).

Knowledge Management is internal to the organisation, and involves using organisational knowledge to sustain or obtain a competitive advantage. Knowledge Transfer is concerned with the internal or external transfer of knowledge in an organisation to enhance the organisational knowledge base. Consequently, Knowledge Transfer relates to Knowledge Management.

5.6.5 Summary

Albino et. al. note that knowledge transfer is a communication process with information processing activities. The knowledge owned by an actor (individual or organisation) can be transferred to another actor by information flows conveyed by appropriate media. Knowledge transfer is important both within the firm and between firms (Albino et. al. 1999). The success of many companies can be based on their ability to transfer knowledge embodied in organisational routines from one organisation to another (Szulanski 1996). Culter notes that the knowledge transfer between two or more actors (individuals or organisations) can be defined as the process by which the knowledge of one actor is acquired by another (Culter 1989). It can take place by means of different ways, for example interaction of personnel, patent disclosures, publications, case studies, manuals, assets or services exchange.

Knowledge Transfer was successfully done in Information Technology through the development of Knowledge Based Expert Systems, as described in Section 5.6.2. Moreover, case studies extracted from the literature (see Sections 3.2 and 5.7) suggest that the transfer of other company experiences, identified through Benchmarking, can become a powerful catalyst for learning and improvement. The success of the

Knowledge Importation case studies presented in sections 3.2 and 5.7 rely in an element of luck concerning the identification of the superior performance and its source at different industrial sectors.

Knowledge Management is concerned with the management of the Knowledge Base in an organisation, while Knowledge Transfer is concerned with the internal or external transfer of knowledge to enrich the Knowledge Base., and therefore it contributes to Knowledge Management.

5.7 Data Organisation

Data can be organised using a variety of techniques to lead to the development of information and subsequently knowledge. A plethora of tools and techniques are available for the analysis and are dependent on the nature of the data.

For numerical data (quantitative), a wide range of tools can be employed to lead to information and subsequently knowledge. Examples include Correlation Diagrams, Histograms, Radar Charts, Statistical Process Control Charts, Six Sigma Analysis, Measles Chart, Bar Charts and Stratification Charts, which involves splitting data into groups to generate graphs.

For textual data (qualitative), a plethora of tools are available for the analysis. Quality Function Deployment (QFD) can be employed to organise data in a diagram to identify interrelationships between any pair of counterpart characteristics. Pareto Analysis involves the identification of the vital few problems or influences which will give a high degree of correction to a problem or effect to an outcome. Interrelationship Diagram can be employed to identify logical strings of connections between several problems or issues. The Affinity Diagram can be used to assemble and group distinct issues, points or details under certain categories or groups. The categories or groups form subsets of a problem, goal or target. The Tree Diagram is employed to arrange goals, problems, issues or requirements in a hierarchy. It shows how a problem, goal, target or grouping is broken down into more detailed sub-problems or sub-goals. The breakdown into greater levels of detail can take place on several levels (Bicheno 1998). The Cause-Effect diagram, also called Ishikawa Fish Bone diagram, is used to associate multiple possible causes or categories with a single effect, which can be characterised as a problem, goal or target. The diagram consists of primary branch representing the effect major and minor branches. Major branches are directly connected to the primary branch, corresponding to a major cause (or requirement) that directly relates to the effect. Minor branches are attached to the major branches corresponding to more detailed causal factors or prerequisites.

A wide range of techniques and variants of techniques are available for the analysis. The choice of the appropriate technique is dependent on the nature of the output and the information required to be extracted.

5.8 Characteristics of the Knowledge Transfer Process

The characteristics of the Knowledge Transfer Process have been developed based on literature review and are divided into six categories, relating to:

- The identification of the target enterprises (**Target**)
- The nature of the model (**Nature**)
- The process characteristics of the model (**Characteristics**)
- The people involved in the process (**People**)
- The location of the Knowledge Transfer process (**Location**)
- The outputs of the process (**Output**).

To establish the categories of the Knowledge Transfer Process, the author employed the five-W's and one-H (5W1H) tool. The 5W1H is employed to question a statement, problem or process from every angle (Robinson 1991). The description of 5W1H and its association with each categories of the Knowledge Transfer process, is shown in Table 7.

5W1H	Description	Corresponding Category
What	What is done?	Nature
Why	Why is it necessary?	Output
Where	Where is it being done?	Location
When	When is it being done?	Location
Who	Who does it?	Target, Location, People
How	How is it being done?	Characteristics, People

Table 7: 5W1H and the Knowledge Transfer Process

The author identified that suitable tools for the organisation and presentation of the characteristics of the Knowledge Transfer Framework into groups are the Affinity Diagram, the Tree Diagram or the Ishikawa Fish Bone Diagram. The Tree Diagram and the Ishikawa Fish Bone Diagram provide a similar approach to data organisation/representation as they associate individual characteristics into groups, which form sub-sets of a goal, problem or target. The Affinity Diagram is employed to group characteristics into categories, which do not entail a strong link to a common goal, as they can contribute to different or independent goals. The Tree diagram and the Ishikawa Fish Bone Diagram were identified as suitable techniques for the representation of the characteristics of the Knowledge Transfer Framework. The author felt that the latter provided a stronger emphasis on the existence of a common goal, problem or target amongst the branches.

All the six categories form the branches of an Ishikawa Fish Bone Diagram. The goal or effect is the Knowledge Transfer Framework, with the primary branches being the six categories of the characteristics. The secondary branches or the causes are the required characteristics for the model. The usefulness of the Ishikawa diagram is the illustration

of the relationship between the individual characteristics (cause) and the Knowledge Transfer Framework (effect).

5.8.1 Target Enterprises

The Knowledge Transfer Process was developed to target Small and Medium-sized Enterprises. Companies are classified as SMEs in accordance with the definition provided by the European Commission, outlined in section 4.2.

Participant companies must employ below 250 employees, have a maximum annual turnover below 40 million ECU's and a maximum annual balance sheet of below 27 million ECU's. In addition, they must not be owned by more than 25% by one or several enterprises that are not SMEs. The targeted enterprises form 99.8% of companies based in the United Kingdom as discussed in section 4.3, and form the absolute majority of companies in various numerous industrial sectors as described in section 4.4. The Knowledge Transfer Process must be industrial sector independent, as discussed in section 4.4.2. Czuchry et. al. note that the most important benefit of searching for better practices across sectors results from the discovery of a best practice that is not utilised in the benchmarking company's own industry. Proven technologies and practices may be available for integration with little modification (Czuchry et. al 1995). Bogan and English, Watson, Cook, Camp and Finnigan mention examples of cross-industrial search for superior practices, as discussed in section 3.2.

The largest concentration of SMEs are classified as small enterprises, employing no more than 50 employees and attaining an annual turnover of less than 7 million ECU's. These companies form 99.1% of the United Kingdom based companies and account for a significant share of the British Gross National Product, as outlined in Section 4.3. However, only a quarter of these companies participate in Benchmarking studies, while less than two thirds were aware of Benchmarking, as discussed in section 4.4.

To summarise the above, the Knowledge Transfer Process targets Small and Medium-sized Enterprises, across industrial sectors.

Figure 13 outlines the target enterprises for the Knowledge Transfer Process.

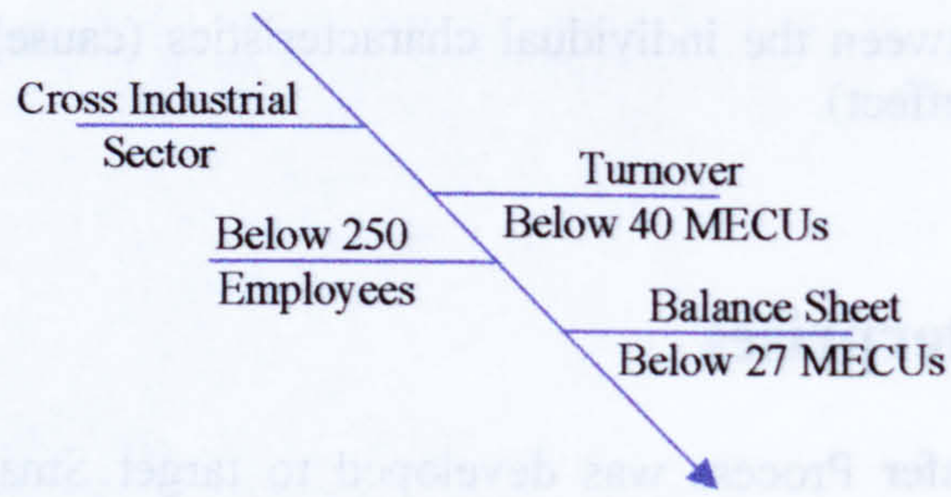

Figure 13: Knowledge Transfer Framework Target Enterprises

Although the Knowledge Transfer Framework was developed to target Small and Medium-sized Enterprises. Special emphasis was placed on targeting small enterprises employing below 50 employees as these companies are more numerous and have fewer resources than medium-sized companies.

5.8.2 Nature

Benchmarking is a structured on-going, continuous improvement process (Camp 1989; Codling 1992; Karlof and Ostblom 1993; Watson 1993; Bogan and English 1994; Andersen 1996; Finnigan 1996; Zairi 1996; Bendell, Boulter et al. 1998) aiming to change business operations in a structured, proactive and positive fashion, to achieve superior performance. Systematically studying the best business practices, operating tactics and winning strategies of others, an individual, team, or organisation can accelerate its own progress and improvement, as discussed in Section 3.2.2. Benchmarking enables companies to acquire a better understanding of their strengths and weaknesses, and consequently to develop action plans and specify targets which can lead to superior or best practice performance. It is an instrument for improvement by providing a reference point (Riis 1995(b)). The Knowledge Transfer Process employs benchmarking practices to identify and establish what is superior practice amongst the benchmarked enterprises, and aims to address the SME Knowledge Deficit, discussed in section 5.5.

SMEs are product and not process orientated as mentioned in section 4.4. Developing the Knowledge Transfer Process based on product orientated performance measures would limit the participant industrial sectors, as cross industrial comparisons would be more difficult to conduct. This is supported by Andersen who noted that product comparisons are typical in competitive benchmarking (Andersen 1998). The type of Benchmarking combination adopted for the Knowledge Transfer Process must be Functional or Generic Benchmarking, combined with Process Benchmarking, which provides a high potential for success as seen in section 3.2.3. The use of Functional or Generic Benchmarking also satisfies the criterion set in Section 5.8.1 concerning the cross industrial sector application of the Knowledge Transfer Process.

A widely recognised business assessment and Performance Measurement model such as the Malcolm Baldrige Award, the Deming Model or the EFQM Business Excellence Model, analysed in section 3.4.2, should be applied to assess Enterprise Performance. This is supported by Conti who notes that a standard model such as the EFQM Business

Excellence Model or the Balridge Model for a wise choice (Conti 1997). The application of a recognised business assessment model will provide credibility in the data collection process, improve the awareness of business excellence models as business improvement tools and facilitate the quantitative assessment of the enterprise. Figure 14, lists the nature of the Knowledge Transfer Process.

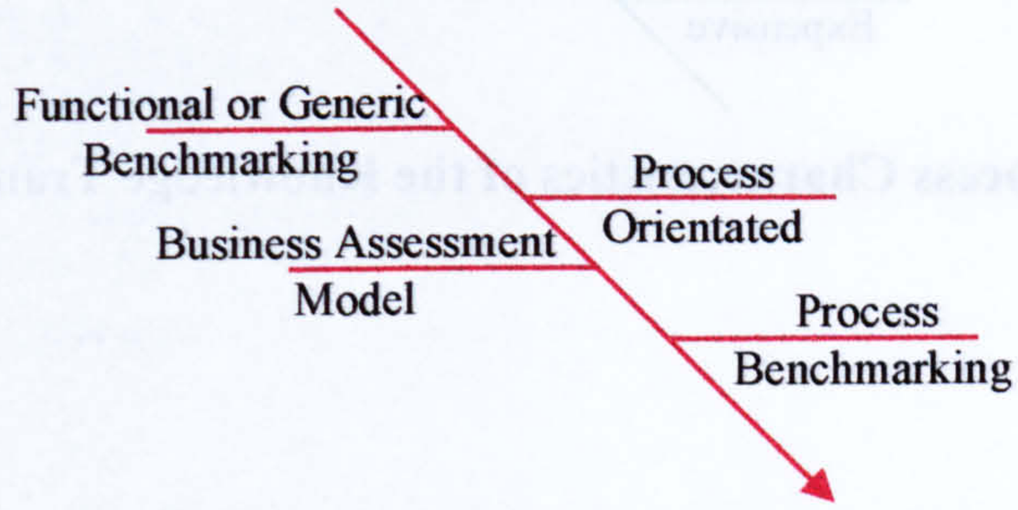

Figure 14: The Nature of the Knowledge Transfer Process

5.8.3 Process Characteristics

The Knowledge Transfer Process must be designed to accommodate Small and Medium-sized Enterprise resource scarcity. The data collection process must cause minimal disturbance to the day-to-day management of the enterprise for the process to gain acceptance amongst smaller SMEs in particular. In section 4.4.1, it was elaborated that SMEs do not have the financial resources, the time and the knowledge required to implement Benchmarking initiatives. SME company employees cannot be expected to conduct complex data collection processes, as they may not have the required knowledge, time or determination and might be put-off by the perceived complexity and the associated burden. The process must be simple and hence not resource intensive.

Consequently, the number of man-hours required to collect the data must be kept as low as possible and the process must not be expensive as the average Small and Medium-sized Enterprise has limited financial resources. This is supported by Micklewright who notes that "too expensive" and "not enough time" are two of the most common reasons why small companies think they cannot afford Benchmarking (Micklewright 1993).

To summarise, the Knowledge Transfer Process must cause limited disturbance to the enterprise and must not impose any strain on the financial, time and employee resources of the SME.

Figure 15, presents the process characteristics of the Knowledge Transfer Process.

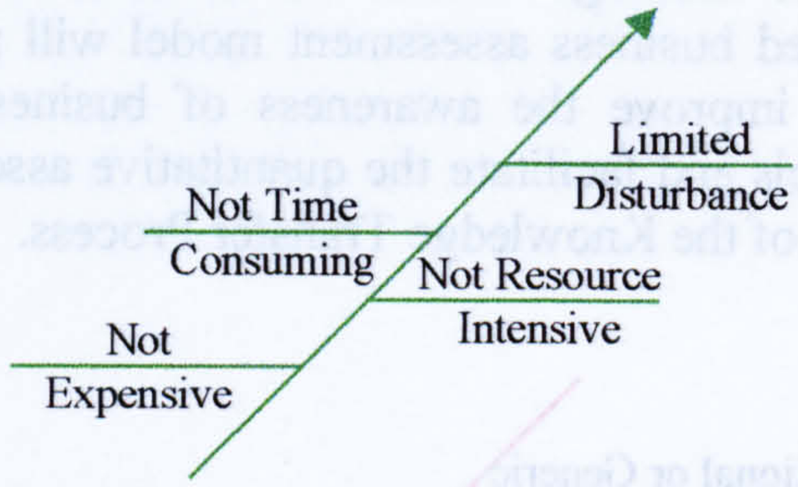

Figure 15: Process Characteristics of the Knowledge Transfer Process

5.8.4 People

Top management commitment is essential for the success of a Benchmarking initiative (Camp 1989; Codling 1992; Watson 1993; Bogan and English 1994; Cook 1995; Finnigan 1996; Zairi 1996). Management involvement is essential to remove employee barriers and obstacles to success such as non-commitment, opposition or reluctance. Management involvement and commitment can ensure that the benefits and outputs of the Benchmarking process are distributed and re-informed, and that a mission statement for the Benchmarking process with confident objectives should be comprehended by all parties involved (Codling 1992; Cook 1995; Zairi 1996). Ramirez and Looney report that amongst Malcolm Baldrige National Quality Award (MBNQA) winners, top management commitment was rated as the most crucial step in a quality improvement process activity, and note that top management commitment must be obvious (.

The managing director of the Small and Medium-sized Enterprise, or a Senior Manager should be appointed as the champion of the enterprise. This person will be directly responsible for collecting the data within the company as enterprises prefer to employ their own staff to collect data internally, as discussed in section 4.4.

Data must be collected both horizontally and vertically within the enterprise. The data collection process must target the opinions and views of more than one person within the Enterprise, to minimise subjectivity. This is supported by Sinclair and Zairi, who in a survey concerning best-practice performance measurement in companies using TQM, they targeted a variety of respondents within each organisation. Their notion was that it is generally accepted that employees/managers in different functional areas will have different opinions on the importance of various performance measures (Sinclair and Zairi 1995). The horizontal data collection will provide a spread of opinions of people sharing similar responsibilities and roles within the enterprise, while the vertical spread will identify gaps between the perceptions of various employees at different organisational levels.

Considering that Small and Medium-sized Enterprises lack the knowledge and the resources to conduct the Benchmarking process and identify potential partners or superior practices, as discussed in section 4.4.1, all data should be analysed and stored externally to the company. An experienced consultant or business advisor should

conduct the analysis, steer the process, and assume responsibility of the acquisition, management and dissemination of knowledge amongst firms.

Small and Medium-sized Enterprises prefer to collect data internally within their own premises using their own personnel to collect data as described in section 4.4. Therefore SME employees must be involved in the data collection process (internal data collection).

To summarise, the Knowledge Transfer Process must ensure Top Management commitment and use data collected by SME employees across different functional areas and management levels. The analysis of the data should be conducted by an experienced consultant or external advisor in the fields of Benchmarking and Enterprise Assessment.

Figure 16, outlines the people that are required for the Knowledge Transfer Process.

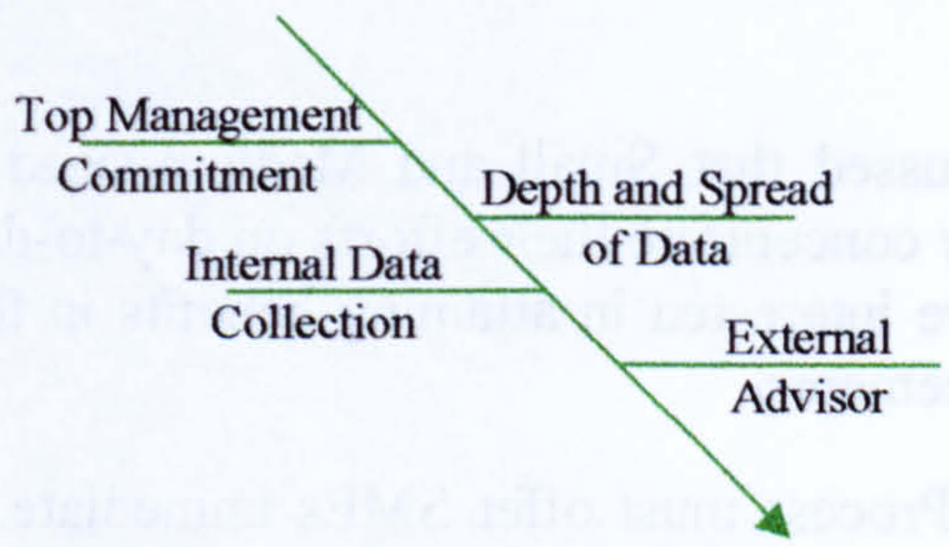

Figure 16: People Involved in the Knowledge Transfer Process

5.8.5 Location

The data collection process should be conducted internally within the organisation to cause minimum disruption to the day-to-day management of the SME, as employees would not have to leave their company site. This is in alignment with the criteria stating that the process should cause minimum disturbance to the SME (discussed in section 5.8.3) and that the data collection should involve SME staff (discussed in section 5.8.3).

The Knowledge Transfer Process data collection process should be based within the enterprise, and analysed by an experienced business advisor externally to the SME, as discussed in section 5.8.4.

Potential establishment of Focus Groups or development of common interest groups must happen in commonly agreed places, accessible by all companies, facilitated by an external facilitator, as discussed in Chapter 2. Such places could be local Business Link offices, regional TECs or LECs, Universities or industrial associations.

To summarise, the Knowledge Transfer Process data collection process must occur inside the SME and the data must be analysed externally by an experienced consultant or benchmarking specialist. The establishment of Focus Group or Common Interest Group Meetings should occur in commonly agreed places.

Figure 17, summarises the location requirements for Knowledge Transfer Process.

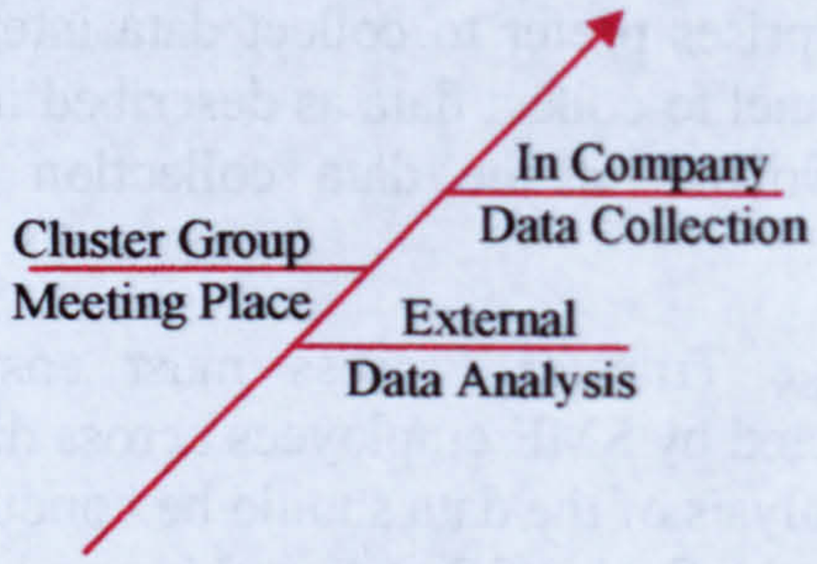

Figure 17: Locations for the Implementation of the Knowledge Transfer Process

5.8.6 Outputs

In Chapter 4, it was discussed that Small and Medium-sized Enterprises experience scarcity of resources. They concentrate their efforts on day-to-day management, aiming to sustain viability, and are interested in attaining benefits in the short-run rather than await for long term advancements.

The Knowledge Transfer Process must offer SMEs immediate results at each stage of the process, and incremental benefits. Incremental change is a gradual process of improvement (Ratcliff 1997).

The Knowledge Transfer Process need not require 100% accuracy of the enterprise data as this would be highly resource consuming. Scarcity of resources mean that only enterprises in the larger scale of SMEs can afford to dedicate time and effort to collecting data that will accurately represent the enterprise. The majority of enterprises do not have these resources. The Pareto rule or the 80/20 principle asserts that a minority of causes, inputs or effort usually contribute to the majority of the results, outputs or rewards (Koch 1998). Data collection must be achieved with the minimum disturbance to the business, as with 20% of the effort, 80% of the accuracy can be achieved. Conti suggests that the diagnostic aspects of assessment must take centre stage, to focus solely on identifying an organisations weak points. Companies should place importance on the high diagnostic capabilities rather than retain emphasis on scoring (Conti 1997).

In Chapter 4, a review of current Benchmarking practices available to Small and Medium-sized Enterprises indicated that Benchmarking tends to be employed as a performance positioning tool, with very low or limited Knowledge Transfer between the superior performers. The Knowledge Transfer Process must take advantage of superior performers and not simply position company performance against them, but provide the opportunity to under performing enterprises to attain knowledge on how better practices were achieved.

To summarise, the Knowledge Transfer Process must offer incremental and fast results to Small and Medium-sized Enterprises, with the aim of improving their performance.

Participant enterprises should be able to learn how superior practices were achieved and the output of the benchmarking process should not be limited to performance positioning and simple comparison. The process need not be based on a highly accurate score assessment for the enterprise, but on a diagnostic performance assessment.

Figure 18 outlines the required outputs from the Knowledge Transfer Process work.

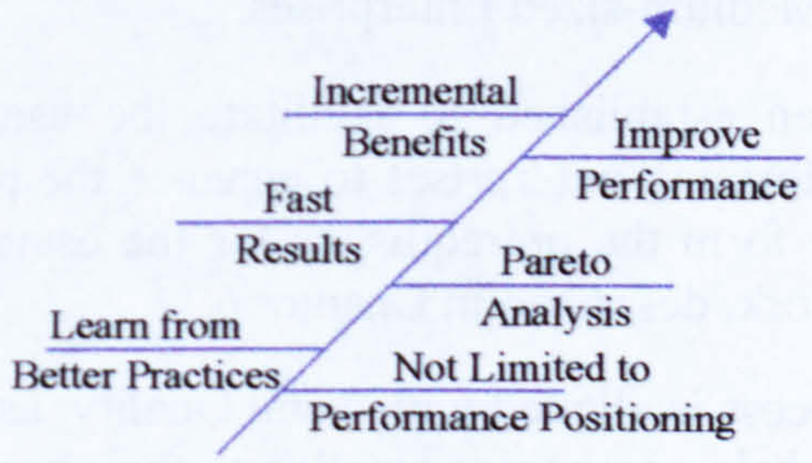

Figure 18: Outputs from the Knowledge Transfer Process

5.8.7 Characteristics Diagram

The collective characteristics for the Knowledge Transfer Process are shown in Figure 19. These provide the map for successful Knowledge Transfer in the SME domain, forming a deliverable of the research. This map provided the baseline for the development of the SME Knowledge Transfer Framework, Chapter 6.

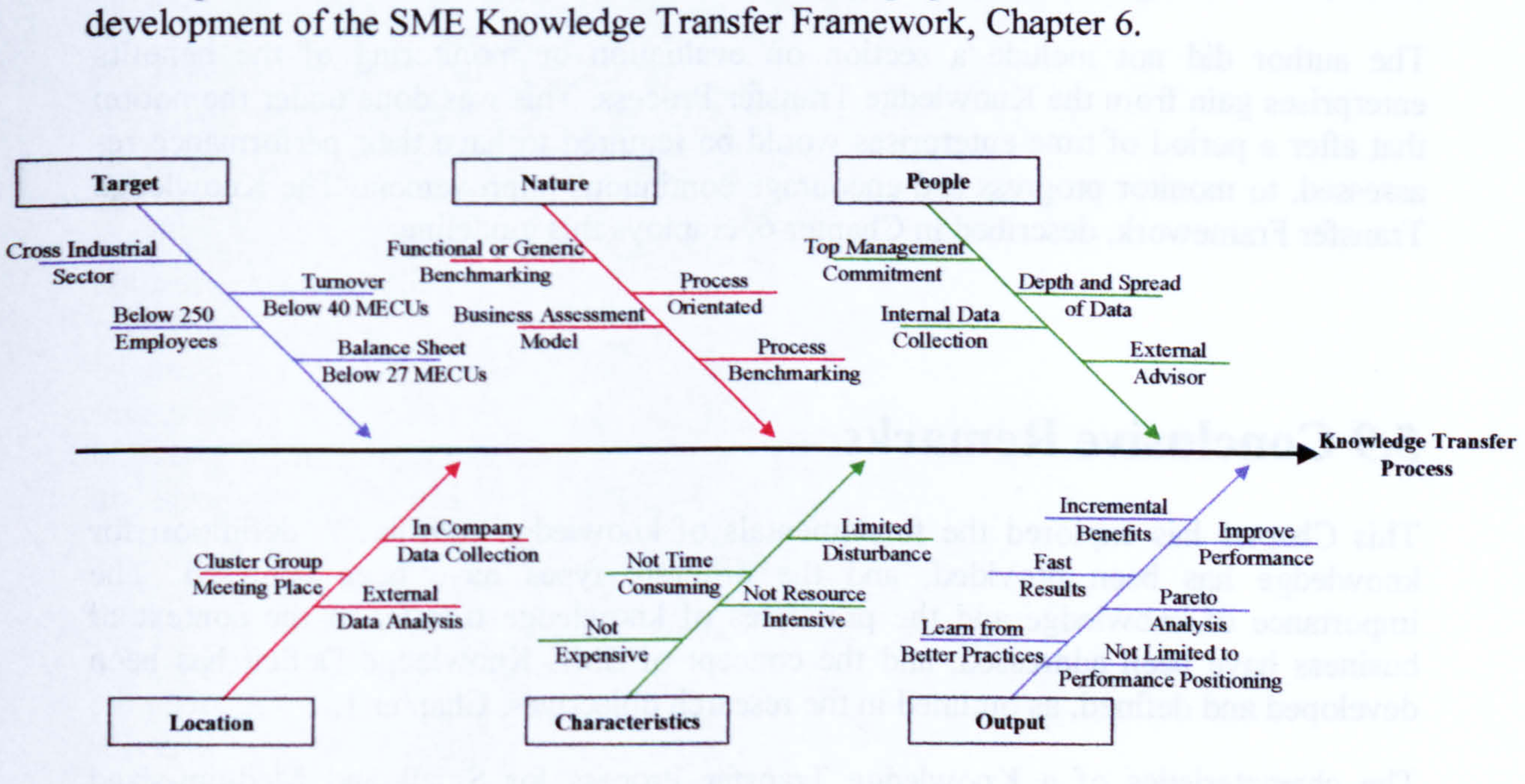

Figure 19: Characteristics of the Knowledge Transfer Process for SMEs

5.8.8 Remarks

The characteristics of the Knowledge Transfer Process have been generated through the literature and surveys on Benchmarking, Enterprise Assessment, Knowledge Transfer and Small and Medium-sized Enterprises, as described in sections 5.8.1 to 5.8.7. The development of the characteristics have been influenced by Total Quality issues, mentioned in section 3.2.7, and have been selected to support Superior Knowledge Transfer amongst Small and Medium-sized Enterprises.

The characteristics have been established to facilitate the use of knowledge-based potential within superior performing enterprises to enhance the performance of under-performing enterprises. They form the prerequisites for the establishment of the SME Knowledge Transfer Framework, described in Chapter 6.

The Knowledge Transfer Process is aligned with Total Quality, as it aims to provide the baseline for a Framework to help companies ameliorate their performance by sourcing knowledge from superior practices. It requires top-management commitment (as outlined in section 5.8.4) and emphasises the need to provide knowledge on how superior practices are achieved in other enterprises (as discussed in section 5.8.6). It uses performance comparisons through benchmarking practices and the enterprise assessment process is based on recognised assessment models as outlined in section 5.8.2. The participation of employees across business functions and organisational levels ensures that people feel ownership of the process (Chase 1995), and top management commitment ensures that the enterprise will be committed in the process (Watson 1993; Bogan and English 1994).

The author did not include a section on evaluation or monitoring of the benefits enterprises gain from the Knowledge Transfer Process. This was done under the notion that after a period of time enterprises would be required to have their performance re-assessed, to monitor progress and encourage continuous improvement. The Knowledge Transfer Framework, described in Chapter 6, employs this guideline.

5.9 Conclusive Remarks

This Chapter has explored the fundamentals of knowledge transfer. A definition for knowledge has been provided, and the different types have been analysed. The importance of knowledge and the principles of knowledge transfer in the context of business have been addressed, and the concept of SME Knowledge Deficit has been developed and defined, as outlined in the research objectives, Chapter 1.

The characteristics of a Knowledge Transfer Process for Small and Medium-sized Enterprises have been identified and categorised, forming a deliverable of the research as described in Chapter 1. The characteristics were determined through an extensive literature review based on the principles of Benchmarking, Self-Assessment and Knowledge Transfer, the essence of SMEs, and a critical review of major Benchmarking tools and practices targeting smaller companies outlined in Chapter 4.

The characteristics were categorised into six major categories, providing information about the target companies, the nature of the process, the people involved, the location for the process, the characteristics of the process and finally the anticipated outputs. The major categories were subdivided to twenty-five sub-elements. The SME Knowledge Transfer Framework described in the Chapter 6 was designed based on the Knowledge Transfer Process recapitulated in this Chapter.

The collective characteristics for the Knowledge Transfer Process, described in

Figure 19, provide the map for successful Knowledge Transfer in the SME domain and form a deliverable from the research, as presented in Chapter 1. The characteristics were established to provide the requirements for the successful application of Knowledge Transfer in Small and Medium-sized Enterprises, according to the research objective set in Chapter 1.

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Chapter 6: The Knowledge Transfer Framework

6.1 Synopsis

This Chapter describes the development phases and the features of the proposed framework to support superior performance Knowledge Transfer and improvement in Small and Medium Enterprises. The design of the framework was based on the characteristics for a Knowledge Transfer Process described in Chapter 5.

6.2 Development

The development of the Knowledge Transfer Framework was conducted through a structures series of discussions with academics and industrialists, as discussed in Chapter 2 and realised through the adoption of Benchmarking and self-assessment as the means of evaluating a company performance and providing the baseline for knowledge transfer.

The Knowledge Transfer Framework was implemented through three stages. The first stage encompassed the conceptual approach to the development of the framework, followed by the framework selection process, which followed by the development of the framework.

6.2.1 Conceptual Design

To confront the SME Knowledge Deficit, discussions concerning possible methodologies for combating the Knowledge Deficit and its implication on continuous improvement practices were conducted with both academics and industrialists.

The author formally approached academics and researchers in the University of Vienna in Austria, the University of Bremen in Germany, the University of Strathclyde, the Bolton Institute Business School, Cranfield University, the University of Newcastle in the United Kingdom, and the University College in Galway, Ireland. Key issues discussed include company performance assessment methodologies, Benchmarking practices, the SME Knowledge Deficit, and problems facing Small and Medium-sized Enterprises.

To gain a wider perspective of the problems that SMEs face, the author conducted an in-depth assessment of twelve Small and Medium-sized Enterprises under the SME Needs Analysis programme of the ADAPT-CORE project. This is described in Appendix C. The companies were based in Bedfordshire, United Kingdom, and employed less than 50 employees. The Needs Analysis assessment is based on several interview sessions with managers and shop-floor employees, and is conducted through open-ended questions. The process takes about three consultant man-days, and a report is provided for the participant company. The majority of the companies undertook the Needs Analysis to assess their operational performance, and identify which areas of their business require improvement. The assessment provided participant companies with an analysis of their strengths and weaknesses, and placed significant emphasis on identifying possible ways to ameliorate corporate performance.

Almost all the companies involved in the conceptual design of the Knowledge Transfer Framework were operating in niche markets, producing highly specialised products, in small batches, customised to customer specifications. The constant production of tailor-made products, or "specials" as they are often addressed by the SME managers, led to a high complexity in their business operation. One of the enterprises, specialising in imaging technologies had two principal products, with about 50 product variants being developed in 1997. The managing director noted that the production of each product variant was considered as a new product development due to the significant changes required by the customers. Similarly, the managing director of an aeroplane and helicopter model manufacturer noted that the variety of aeroplane types combined with the different artwork required for each airline imposed high complexity in his business as virtually every order can be treated as new product development. Likewise, a company producing crystal ornaments noted the complexity in their production and business processes, as they had to produce new designs for small batch productions to satisfy their customers. The managing director noted that the company was constantly seeking new ways of operating more effectively to the customer requirements. A cosmetics company noted that the high complexity in production and storage came from the manufacture of lipsticks, nail varnishes, eye liners in more than 100 different colours, combined with the short delivery times requested by their customers. Lack of proper organisation lead to the storage facility occupying almost three quarters of the factory.

One enterprise was involved in the service sector, with the principal area of the business being in film processing and printing industry. The company largely diversified their services as traditional professional photographic processing services were decreasing rapidly. The new services were imposed due to advances in Information Technology and include digital image editing and processing, lithographic and waterproof printing and design of advertising and promotional material. The rapid advances in Information

Technology impose high strain on the business in terms of management of change, staff training and financial resources. Complexity for the business arose from the need to be at the forefront of technological advances to ensure a sustainable future, rather than from the large variety of customer orders. The nature of the complexity was different from the manufacturing SMEs.

All the enterprises noted a higher complexity in their business over the year arising from either the production of customised products or the rapid increase of technological advances. They felt they had to change the way they were operating to remain competitive and sustain their operations. The companies operated in high uncertainty markets where customer loyalty was minimal, and attracting new customers and keeping old customers were of prime importance to their business.

The Needs Analysis interviews outlined that managers in the participant enterprises required assistance to improve their business. They did not know how to prioritise in non-financial terms the most crucial shortfalls in their business, and found difficulty in implementing changes. The author believes that the SME Knowledge Deficit outlined in Section 5.5 can characterise their difficulties.

An emissions analyser equipment manufacturer company has developed a wide portfolio of services to support their products, which are customised to the customer specifications. The managing director outlined that the company has achieved a profitable turnover in 1997, and noted:

> "We think we have optimised our business operation but we are not sure about it. Are we really good performers? Can we improve our operations?"

The director felt that the company was operating efficiently and effectively, however, he wasn't sure if operations and processes could be further improved.

The production manager of the cosmetics manufacturing company confessed that:

> "We know we have some problems with production control. It would be very helpful to know how other companies tackle production scheduling, and hopefully the Needs Analysis will give us some assistance."

The production manager knew that there were problems with the company production scheduling, in terms of both production operations and supplier deliveries. The company had a large stock of raw materials and the warehouse was overflowing with final product stock. The turnaround time for some final products and raw materials in stock in some cases was longer than six months, or as little as two days. The key issues were production control and inventory management. The production manager wanted to know how other companies were tackling these problems.

Most of the SMEs were employing accounting measures to identify how efficiently and effectively they were operating. All the companies that undertook the Needs Analysis wanted to know how other similar sized companies have successfully solved problems of similar nature to their own, and were more interested in learning about potential solutions to their problems or difficulties, rather than a simple Needs Analysis.

The enterprises were valid to the research as they employed less than 50 employees, had a turnover less than 7 million ECU (approximately 5 million pounds sterling), a balance sheet of less than 5 million ECU (approximately 3 million pounds sterling), and operated in high uncertainty markets, incorporating high complexity in their business as noted in Chapter 1 by Puttick. The purpose of the Needs Analysis was to identify weaknesses in the business operation, so that the ADAPT-CORE project would provide enterprises with appropriate training, consultancy advice or support to improve business performance.

The author identified that all the enterprises needed assistance on their improvement activities. The enterprises acknowledged that they undertook the Needs Analysis to gain an external perspective on how well they are performing, and to identify what areas of their business needed improving. All the companies were eager to find out how other enterprises were addressing similar problems to their own. In presenting the Needs Analysis report back to the enterprises, the author described not only what improvement activities they should fulfil, but also provided some guidelines on specific actions, which would assist them.

Through and the literature review, the author intimately investigated the nature of the small companies, their problems, and thought the Needs Analysis process the author verified the existence Knowledge Deficit in the participant Small sized Enterprises.

6.2.2 Conceptual Model

The Needs Analysis of the ADAPT-CORE project indicated the existence of SME Knowledge Deficit in the participant enterprises. Decreasing the SME Knowledge Deficit could help the enterprises become more competitive and subsequently lead to long term sustainability, economic development.

The author considered four approaches to abridge the SME Knowledge Deficit. These we conceived through the experience the author gained through the Needs Analysis and Cluster Group Initiatives under the ESF funded ADAPT CORE Project, the European Commission ESPRIT ENAPS Project, and through structured discussions with academics and industrialists as discussed in Chapter 2. The approaches were substantially assessed against the characteristics for a Knowledge Transfer Framework described in Chapter 5.

The proposed models for the Knowledge Transfer Framework were:

- Information Technology based training system
- Training Needs Analysis through an experienced consultant
- Establishment of Learning Cluster Groups between enterprises
- Integrated application of Self-Assessment and Benchmarking practices supplemented by Focus Group meetings.

The first approach was to develop an Information Technology based training system for managers to enhance their awareness of better practices and how they could improve their business operation. The training would be conducted using multimedia systems or through a web based tool, using Personal Computer (PC) systems. The system would interact dynamically with the user, and tests would be employed to assess progress and understanding. Case studies would be incorporated to display better practices, and an enterprise performance assessment questionnaire would be used to assess the company strengths and weaknesses. The external reference point would be provided through the case studies that would elaborate on superior performance practices, and knowledge would be sourced from the incorporated information. The importance of Information Technology in education and training was recognised the UK Higher Education Funding Councils who funded the Learning and Teaching Technology Programme, aiming to develop new and advanced computer based training applications (TLTP 1995). The European Social Fund favours cutting-edge information and communication technology as a training tool for SMEs (ADAPT 1998). There is a general consensus in the literature of the use of IT in distance learning and education (Verduin 1991; Willis 1993). Petropoulakis reports that the use of Information Technology has provided a radical approach to applying education and training (Petropoulakis 1997).

The second process would be to assess the company through the use of an experienced consultant or assessor. The assessor would spend some man-days in the company observing how internal processes and operations are carried out, and subsequently identify areas for improvement. The results of the assessment would be a Training Needs Analysis that would identify the training needs of individuals and match these needs to company objectives. The process would enable the company management to agree and implement co-ordinated, cost-effective and cohesive training programmes, which would enhance the competitiveness of the enterprise. The external reference would be provided through the experienced consultant, who would assess the company and identify strengths and weaknesses. Knowledge would be sourced from the consultant, in terms of company performance, and through the training courses, in terms of improvement practices. Needs Analysis can be employed to identify training needs within Small and Medium-sized Enterprises (Bartram et. a. 1997; Craig 1994; Kaufman 1993)

The third process was to establish Learning Cluster Groups, or business common interest groups. The groups would be established with a maximum of 10 companies and would meet at a predefined location at least once a month. At these meetings, the members would discuss everyone's progress, successes, problems, and try to answer possible queries. The meetings would have a particular topic of focus each time, covering a wide range of business related activities and would be facilitated through an experienced consultant. The external reference point would be provided through interactions with other companies, while the assessment of the company strengths and the individual managers would assess their company performance through conversations within the group. Knowledge would be sourced from other participants in the Learning Cluster Groups. The United Nations states that SME clustering and networking have been increasingly attracting the attention of academics, policy makers, trade practitioners and international organisations (UN 1998).

The fourth considered process was to combat the Knowledge Deficit in Small and Medium-sized Enterprises through the application of Benchmarking and Self-Assessment practices, which would provide a reference point for performance standards. The process would be based on an in-company assessment methodology that would indicate corporate strengths and weaknesses. Knowledge would be sourced from better practices within the Benchmarking database. How superior performance was achieved in the enterprises would be considered, supplemented by the realisation of Focus Group meetings. Companies would discuss their strengths and disseminate how they attained superior performance. Hines proposes a similar approach for the creation of world class suppliers realised through the realisation of a supplier association (Hines 1994). Hines's model employs benchmarking practices to assess suppliers in line with the requirements of the Original Equipment Manufacturer (OEM) and employs group activities in the form of learning clusters to share information.

6.2.3 Selection of Concept

The preferred process for the Knowledge Transfer Framework must be designed to tackle the Knowledge Deficit described in Section 5.5. The SME Knowledge Deficit can be characterised as the difficulty that SME managers experience in identifying and prioritising what area of their business to improve (*weakness identification*), the unawareness of what performance standards they must attain (*awareness of performance standards*), their bewilderment of where and how to acquire and find superior practices (*where and how to acquire knowledge*), supplemented by the difficulty in using and applying superior practices internally (*how to implement improvement activities*).

The author decided to employ the Self-Assessment and Benchmarking to address the issues of the SME Knowledge Deficit. The company would collect the information in-house from a range of employees, which upon analysis by an external to the company benchmarking specialist, would identify strengths and weaknesses in key areas of the business. Through the use of Benchmarking practices, the enterprise would increase its awareness of performance standards achieved by other enterprises, and attain knowledge of superior performance standards. Finally, with the establishment of appropriate company groups, the participant enterprises would exchange expertise on how better practices were achieved. The author chose this approach to investigate whether the combination of Self-Assessment and Benchmarking could lead to potential superior performance knowledge transfer in small manufacturing enterprises, facilitated through then use of Focus Groups.

Table 8 demonstrates how the Self-Assessment and Benchmarking process was designed to fully comply with the prerequisites (characteristics) of a Knowledge Transfer Process, presented in Section 5.8.7. The left hand side column of the table displays the characteristics as described in Chapter 5, and the right hand side column outlines how the Self-Assessment and Benchmarking process conforms with these characteristics.

Characteristics	Self-Assessment and Benchmarking
1) Target Enterprises	
Cross Industrial Sector	Companies from different sectors are expected to participate
Below 250 Employees	The Knowledge Transfer Framework was designed for SMEs, but special emphasis is placed at SMEs employing less than 50 employees.
Turnover Below 40 M ECU's	Knowledge Transfer Framework was designed for SMEs, but special emphasis is placed at SMEs with turnover below 7 Million ECU
Balance Sheet Below 40 M ECU's	Knowledge Transfer Framework was designed for SMEs, but special emphasis is placed at SMEs with turnover below 5 Million ECU
2) Nature	
Functional or Generic Benchmarking	Cross sector Benchmarking will be used for enterprise performance comparisons
Business Assessment Model	The EFQM model provides an excellent model for business assessment
Process Orientated	The EFQM model is process orientated
Process Benchmarking	Cross enterprise comparisons will be conducted based on the EFQM model, leading to Process Benchmarking
3) Process Characteristics	
Not Time Consuming	Enterprises will conduct the Self-Assessment to provide the data for the Assessment and Benchmarking stages
Not Expensive	Only indirect costs will occur to the enterprise. These include the Actual and Opportunity Cost-of-Time for the employees to conduct the Self-Assessment and to participate in the Focus Groups.
Limited Disturbance	Disturbance will occur only at the Assessment stage for the data collection process
Not Resource Intensive for the SME	Company resources (staff and time) will only be required during the Assessment stage, and only several man-hours for the Focus Group meetings.
4) People	
Top Management Commitment	Top management is involved during all three stages. Their on-going commitment must be ensured from the early stages, hence the introductory meeting during the Self-Assessment stage
Internal Data Collection (by SME Employees)	Company employees will collect the data internally
Depth and Spread of Data	Management and Shop-floor employees are required to participate in the Self-Assessment stage.
External Advisor	The Knowledge Transfer Framework is facilitated through an external advisor who is responsible for the data analysis and the conduct of all operations with the exception of the data collection process..
5) Location	
Cluster Group Meeting Place	Focus Group meetings are conducted at Cranfield University
In Company Data Collection	No employees are taken outside their working environment to contribute to the data collection process.
External Data Analysis	Data is analysed externally to the enterprise by a consultant/external advisor.
6) Outputs	
Incremental Benefits	The enterprises receive feedback at the end of each stage
Fast Results	Companies can complete all stages in three days (one day for each stage) providing participation of a satisfactory number of companies in the Focus Group
Learn from Better Practices	Companies learn from Better Practices during the Focus Group meetings
Improve Performance	The aim is for companies to learn how to improve their performance through tackling the SME Knowledge Deficit
Pareto Analysis	Self-Assessment can provide a significant accuracy. With 20% of the effort, 80% of accuracy is achieved. Higher accuracy can be achieved through award assessment, which would inflate significant strain on the Enterprise resources.
Not Limited to Performance Positioning	The aim of the framework is not to solely compare SME performance, but to learn from better practices

Table 8: Knowledge Transfer Framework and Process Map Compliance

The use of Self-Assessment and Benchmarking process in SMEs had the disadvantage that the author had to conceive, design and implement Information Technology Based

systems to support the data analysis and performance comparison process. The author decided to establish a set of Internet-based tools for the data analysis and reporting stages of the Knowledge Transfer Framework to enable transnational co-operation of the partners of the ADAPT-CORE project in Spain and Germany. Establishing the Information Technology infrastructure required an extensive programming effort at the early stages, which displayed tangible benefits at subsequent stages, as key elements of the analysis and reporting process were automated and accessible through the Internet.

6.3 Implementation Framework

The selected process to implement the Knowledge Transfer Framework was through the integration of a Self-Assessment process with a Benchmarking process, supplemented by Focus Group meetings. This led to the creation of three stages for the framework: the Assessment stage, the Benchmarking stage and the Focus Groups stage.

The first stage of the process incorporates the enterprise assessment. The objective is to collect data within the company, preferably in qualitative and quantitative formats, horizontally and vertically within the organisation. This is a critical step, which provides the profile of the company, identifies communication problems within the company, provides an understanding of the strengths and weaknesses of the business and analyses their correspondence with the critical success factors affecting the business.

The second stage involves mapping the profile of the company on a performance grid, with the aim to position the company against external practices. This stage provides the participant SMEs with a comparative analysis of their performance against other company performance levels. The third and final stage forms the most important element of the framework. Through the implementation of Focus Group meetings, better practices and superior performance activities are disseminated, and task defined specific solutions are outlined on how better practices can be achieved.

The Knowledge Transfer Framework is designed on a modular basis. Feedback to the company is provided at every stage, which provides the baseline for the improvement activities, and offers the possibility for a company to withdraw from the process at any given stage.

The Knowledge Transfer Framework is presented in three stages, each stage representing a process towards improvement of Small and Medium-sized Enterprise performance. The assessment stage identifies the enterprise strengths and weaknesses, and outlines potential communication problems. The assessment stage report can be employed to prioritise areas for improvement and addresses the first element of the SME Knowledge Deficit, elaborated in Chapter 5. The outcome of the second stage is a Benchmarking report, which positions the enterprise performance against other similar sized enterprises, and present superior performances to the enterprises. This stage addresses the second element of the Knowledge Deficit by improving the awareness of superior performances. The Focus Groups stage sources better practices from superior

performing enterprises, and provides specific tasks on how superior performance was achieved. This stage tackles the third and fourth elements of the Knowledge Deficit.

The implementation methodology focuses on overcoming the Knowledge Deficit obstacle for Small and Medium-sized Enterprises. It provides a structured approach to extract superior performance practices from companies, which can be classified as better performers.

An outline of the Knowledge Transfer Framework is shown in Figure 20. The stages of the framework are described in detail in the Sections 6.3.1 to 6.3.3.

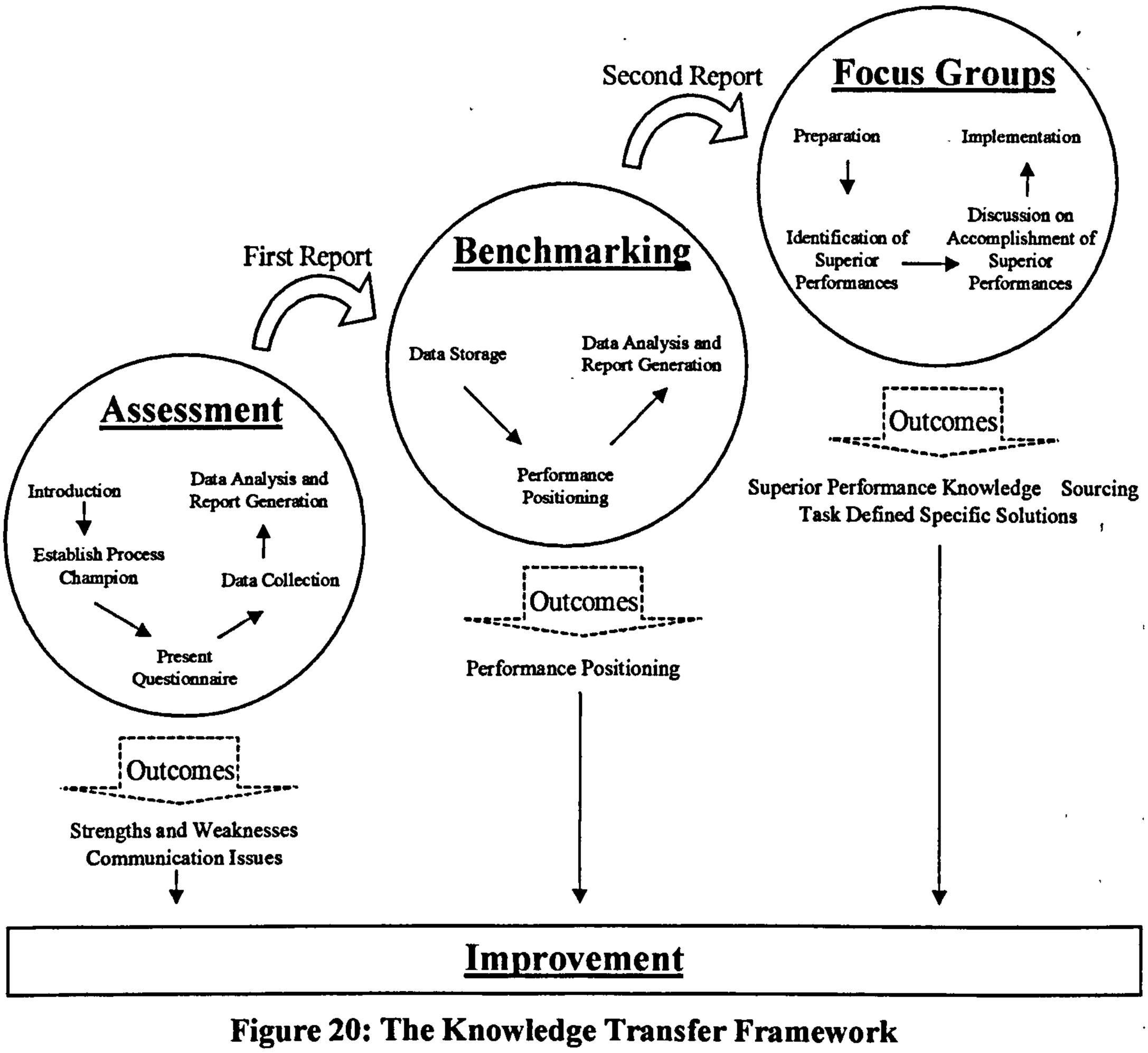
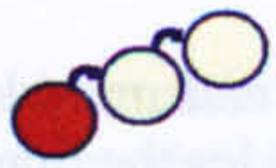


Figure 20: The Knowledge Transfer Framework

6.3.1 Stage I: Enterprise Assessment



6.3.1.1 Introduction

The first stage of the process incorporates the enterprise assessment. It is subdivided into five principal activities and forms the Performance Measurement System (PMS) for the Knowledge Transfer Framework.

6.3.1.2 Purpose

The purpose of this stage is to collect data from the company and provide an assessment of its business processes. Emphasis is placed on identifying the strengths and weaknesses in the organisation, thus targeting the first element of the Knowledge Deficit mentioned in section 5.5

6.3.1.3 Process

The Enterprise Assessment Process is divided into five stages: the introduction process, the process champion identification, the questionnaire presentation, the data collection process and finally the data analysis and report generation. Each of the stages are analysed in the following sections.

Introduction Process

The first element involves an introductory meeting between the person carrying out the SME assessment (thereafter named process administrator), the managing director (or the owner of the company) and if possible other members of the managing team. It is necessary to clearly and simply explain the Knowledge Transfer Framework stages, how it should be employed to improve business performance, what are the requirements of the company and what are the deliverables. During the meeting, the management should be familiarised with the process.

The role of the manager (or owner) is very important in the implementation of the framework, as it supports a dual role. Top management involvement signals across the company that the SME is fully committed to the process and acts as a catalysts for change management when improvements will be implemented. If the level of top management commitment and involvement cannot be achieved, the implementation should be abandoned. For the process to be successful a company must have the culture to support change and Benchmarking.

Establish Process Champion

A principal outcome of the first orientation meeting is the selection of the process champion inside the company. This person will be the principal contact between the company and the person conducting the Knowledge Transfer Framework. It is

preferable if the champion has managerial status within the company, with cross functional responsibility, with a quality background expertise.

The champion should be one of the participants in the orientation or introductory meeting and must be fully aware of the Knowledge Transfer process. They will oversee the data collection process within the enterprise, answer any questions that the employees might have, and represent the enterprise in the Focus Group meetings. If the champion wasn't involved in the orientation meeting, the process administrator must familiarise them with the Knowledge Transfer Framework.

Present Questionnaire

The third stage in the process involves presenting the assessment questionnaire to the champion. The assessment questionnaire is based on the widely recognised European Foundation for Quality Management (EFQM) Business Excellence Model, presented in Chapter 3, and the data collection process is done through self assessment practices. The EFQM model was chosen as the basis for the assessment process over the other performance assessment models outlined in Section 3.4, as it is widely recognised in Europe as a model for business assessment, it provides a structured and balanced overview of the business enablers and results, and covers a comprehensive range of strategic issues. Moreover, the EFQM model is recognised by the European Commission Directorate General III as a model for business assessment (Mendes 1998), encouraging its transnational application.

It is essential, to introduce the EFQM model to the process champion, and present how it can be employed to assess business performance. The champion must fully familiarise themselves with the questions, as company employees will contact them should any queries arise.

The enterprise assessment questionnaire was developed through the PRIMA Project (the equivalent of the ADAPT-CORE in Spain), was based on the EFQM model, and was tested in 240 Small and Medium-sized Enterprises in the region of Aragon in northern Spain, and was employed by 10 consultants. The author adopted the questionnaire as it was validated in a large number of SMEs, leading to the establishment of a significant enterprise database of Spanish enterprises. The author felt that this was a large step towards establishing the transnational Benchmarking partnerships, as one of the three countries in the ADAPT-CORE project already had collected a significant amount of data. The author translated the PRIMA questionnaire in English and in German and introduced linguistic changes to strengthen the meaning or the context of some questions, and simplify others so that shopfloor personnel could complete the questionnaire. The translated questionnaire was divided by the author into nine sections, each corresponding to an element of the EFQM model, and the questions are divided into a total of twenty-six sub categories. The questionnaire developed is attached in Appendix D.

In the Knowledge Transfer Framework, the administrator guides the champion through all the sections of the questionnaire and clarifies any queries that may arise in any questions. All the questions query the extent at which processes or actions are implemented within the organisation, and the answer is expressed in a percentage. The original version of the questionnaire incorporated a single box per question, which

would be filled by the person completing the questionnaire with a percentage score. To simplify the process five boxes have replaced the single box, each representing a band of 20 percentage units in the score (e.g.: 0-20%, 21-40% etc.). To complete the questionnaire, the employee would have to tick the appropriate box in every question. This approach would decrease completion time, aid the ease of completion and simplify the analysis process. The spread of 20 units was preferred over the 25% spread as proposed by the EFQM (Foley 1994), as it would provide a five box option instead of four leading to a wider range of possible answers. In addition, the 20% will produce a slightly higher accuracy in the results. In designing the questionnaire presentation, it was felt that it is easier for employees to fill the questionnaire by placing a tick to the appropriate box, rather than indicating a specific value.

The design of questionnaire would simplify the data collection process but would decrease the accuracy level. However, considering the Pareto rule (Koch 1998), 80% of accuracy can be attained through 20% of the effort. After all, SMEs do not have the time to collect the data which would ensure 100% accuracy for the company, and therefore the five boxes approach for the data collection was adopted.

Data Collection

The next stage forms the data collection process within the enterprise. To overcome the problem of objectivity in enterprise assessment over a single company dataset, the EFQM questionnaire is distributed both horizontally and vertically within the organisation. Top and middle management datasets are essential for the analysis process, as managers emphasise and actualise the basis for decision making through crucial internal information. The process also recognises that shopfloor workers are of high importance as they provide the foundations for the business operation. Ideally, returns from shopfloor workers will account for as much as forty percent of the received datasets from any given company.

The questionnaire is distributed in the company through the process champion, who must briefly discuss the objectives of the process with the employees and encourage their participation. The preferable way of distributing the questionnaire is during a meeting, which will be attended by both managerial and non-managerial employees. All questionnaires are anonymous and people are encouraged to answer their questions based on their knowledge and perception of the company operations and processes. The champion must emphasise that if people do not know the answer to a question, they must leave it black, as this indicates lack of knowledge of a specific question or business area.

Qualitative data is collected through an interview with the manager of the enterprise and some employees, followed by a plant tour, and is conducted by the administrator. The questionnaire employed for the qualitative data collection is attached in Appendix E. The purpose of the qualitative data collection is for the administrator to get an understanding of the company processes, its products and services, and their market place. Collecting both qualitative and quantitative data ensures a certain level of objectivity and confidence in the next stage of the process which forms the analysis stage. All the questionnaires are collected internally and sent back to the process

administrator who conducts the analysis externally to the company. The champion is required to note if managerial or non-managerial staff completed a questionnaire.

Data Analysis and Report Generation

The analysis stage and report generation has two objectives: to provide the company with a profile of its strengths and weaknesses and to display any communication problems within the enterprise.

The first part in the analysis process is to syncopate the quantitative data received by the enterprise employees to a consensus set of data, which will provide the company profile. Each ticked box, corresponds to the mean value of the percentage band of that box. For example, a tick on the first box, which corresponds to a percentage band between 0% and 20%, is equivalent to 10%. Similarly selecting the third box, which corresponds to the band between 41% and 60%, is equal to 50%. All the questionnaires are then inserted into an excel spreadsheet to calculate the corresponding average value for each question.

In a second spreadsheet, the difference of each employee answer to a question for the average for that question is calculated. Differences greater than 30% indicate that the person has a different opinion for that question than the majority of the other employees. Although the questionnaires are anonymous, differences may be found in perceptions between the managerial and non-managerial staff, which indicate some communication problems within the enterprise.

The official award scoring system for the EFQM European Quality Award indicates that differences greater than 20% should be investigated to lead to a consensus score, hence providing rigour for the award scores. However, the Knowledge Transfer Framework could not be based on detailed and austere award scoring system as this would impose strain on SME resources, and oppose the Knowledge Transfer Process characteristics defined in Chapter 4. Considering that the accuracy of the research would be decreased by following a self-assessment scoring process rather than an award assessment scoring process, the author concluded that a higher percentage gap was required to inaccurate data which could be given by employees since none of them have received formal EFQM scoring training. The author felt that a 40% gap in individual perceptions could hide communication problems, as it would only investigate differences in individual perceptions with a deviation of 40% from the average. For example, if the average score for a question was 50%, only individual answers below the 10% score and above the 90% score would be investigated, leading to a low potential of unveiling differences in perceptions. The author decided to use the 30% performance gap, as it was considered large enough to cater for inaccuracies in the data and small enough to unveil potential communication problems through differences in opinions of individual employees.

The next stage in the analysis process is to calculate the average percentage value for each area of the EFQM model, using only the consensus questionnaire data, and subsequently the EFQM score for each element of the model and the total score for the company. Conti believes that the EFQM score is not highly relevant unless a company is progressing towards the EFQM Best Company Award (Conti 1997). The Knowledge Transfer Framework is based upon the percentage scores for the principal reason that all the scores are normalised on the same scale, with a maximum score of 100%. If the

EFQM score were employed, then results would be disproportionate owing to the EFQM scaling factors. For example it would not be helpful to compare the EFQM score of the impact on society and customer satisfaction, as the maximum for the impact on society is only 80 points, while for the customer satisfaction criterion, it is 200 points.

The percentage scores for each of the elements of the EFQM model are plotted on a bar chart graph, and the average percentage score for the company is calculated. This graph is employed to assess the relative strengths and weaknesses of the company. At this stage, no external comparison to the strengths and weaknesses of other companies is provided.

Areas with significantly lower score than the average signify weak areas while areas with higher percentage score than the average for the company signify strengths. In general, scores below 50% are considered as low scores, while scores above 60% high. Companies between 50% and 60% still require to improve their performance. These figures were calculated based on the Practice-Performance Categorisation chart developed for the Probe Initiative, which stated that companies with performance of below 50% on either the Enablers or the Results elements of the EFQM model (described in Chapter 4) are underperformering. In the same performance categorisation, companies within the 50% and 60% score bandwidth, in both the Enablers and the Results elements, are classified as "makeweights", while companies with scores above 60% are classified as contenders and above 80% as world class.

To facilitate the classification, the SME Enablers versus Results graph was used. The basis of the graph has been the proven practice-performance categorisation grid used by CBI, IBM and the London Business School for the Probe Benchmarking initiative, and is shown in Figure 21. The aim of the graph was to characterise an enterprise based on its performance.

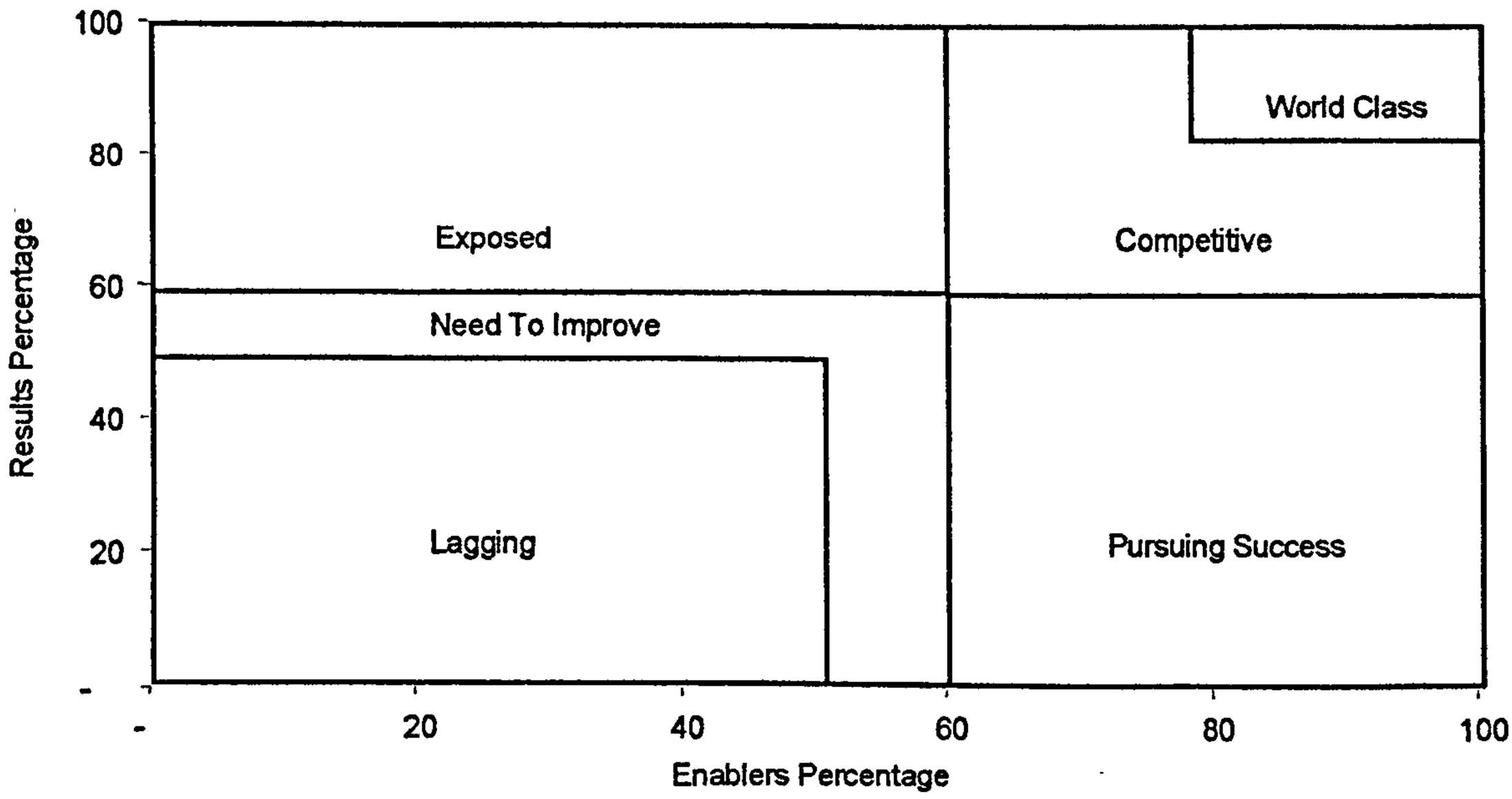


Figure 21: The Enablers versus Results Graph

A company with an average performance of below 50% for both the business results and the enablers is classified as lagging and must engage in performance improvement initiatives to increase its competitiveness. Companies indexed below 60% on results and enablers criteria, but not classified as lagging have the need to engage in performance improvement activities.

An average score of greater than 60% for the results but below 60% for the enablers would identify a company as "exposed" to market threats. SMEs in this category are effective, since they take advantage of their competitive position, but are not efficient. Thus, their competitive position is under constant threat from market threats or new competitors. A company with a high enabler score (above 60%) but low results score (below 60%), is characterised as "pursuing success", which identifies companies which have the potential to become highly competitive by improving their business performance (results).

A competitive company is considered having a score of 60% or higher for both the enablers and the results. Companies that attain a score of 80% in both the Enablers and Results elements of the EFQM Model are classified as World Class. Every company must always try to improve their business performance.

The graph is employed at this stage to characterise the company performance, and forms the basis for the Benchmarking stage of the process. The validity of the results is tested through the qualitative data collected through the informal interviews and the plant tour by the administrator.

Chapter 7 involves the practical application of the framework, and the analysis process is demonstrated through practical case studies.

6.3.1.4 Output

The enterprise assessment stage of the Knowledge Transfer Framework has two principal outputs:

1. Establishes the strengths and weaknesses of the company based on the EFQM model.

2. Identifies possible internal communication problems within the enterprise.

The outputs are handed to the company in the form of a written report and presented to the management of the company and the process champion through a short presentation, by the administrator. A discussion of the findings follows the presentation and the next steps in the process are outlined.

6.3.2 Stage II: Benchmarking Process

6.3.2.1 Introduction

The second stage in the Knowledge Transfer Framework involves positioning the company performance against other Small and Medium-sized Enterprises. This identifies sources of superior practices and better performance, both regionally, nationally and internationally. This was achieved through the ADAPT-CORE project partners. They agreed to implement the author's SME Benchmarking methodology in their regions, namely Tyneside and Bedfordshire in the United Kingdom, Aragon in Spain, Nordrhein Westphalia and Hessia in Germany. The EFQM questionnaire, which originated from Spain, has been translated into English and German to support the data collection process, and guidelines were submitted by the author to the partners on how to collect data in their regions.

6.3.2.2 Process

The Benchmarking process follows the enterprise assessment stage and is sub-divided into three sections: the data storage, the performance positioning, and finally the data analysis and report generation process.

Data Storage

Participant companies were provided the opportunity to co-operate with companies from Spain and Germany, hence taking full advantage of the transnational partnership of the ADAPT-CORE project. It was felt that the data storage system should be available for all the partners at any time, provide the feeling of distributed ownership, while maintaining the Intellectual Property Rights for Cranfield University, United Kingdom. The most attractive solution was to store the questionnaire data on the Internet through a secure web-site. The major benefit of the Web site is its accessibility from Germany, Spain and the United Kingdom, 24 hours a day, 365 days a year. Data can be up-loaded, or retrieved anytime, and from any partner in the Knowledge Transfer process within the ADAPT-CORE project, regardless of location. The cost of the development of the web site was minimal as it was implemented through the author's experience on Internet based application design and implementation. The degree of accessibility offered by the Internet is impossible with any other form of communication system - at any price.

The data from the consensus questionnaire obtained from the enterprise assessment, is stored in a secure, password protected Internet based database. The database, which is developed under Microsoft Access, is stored on a secure Microsoft Windows NT4 server, running Internet Information Server 4 and ODBC32 database connectivity. Access to the data is only granted to the ADAPT-CORE project partners through a different username and password for each partner, controlled by Cranfield University. An Internet based tool written in Microsoft Active Server Pages (ASP) code controls

database operations. A description of the Internet based tool, with a series of screen captures, is provided in Appendix F.

The Internet based tool offers the following options to the partners in the project:

- **View Available Company Listings**. Through this option, the user can search companies by industrial sector, region or view all database entrants.

- **Enter A New Company Listing.** This can be employed to add a new company in the database. This is achieved through an on-line form, and is uploaded automatically without any user or administrator intervention.

- **Update A Company Listing**. This option can be used to alter an existent company data in the database.

- **View A Company Listing.** Through this option, the user can view existent company data stored in the database.

- **Performance Analysis**. This option positions the company performance against other SMEs, through the calculation of the percentage score for each of the elements of the EFQM model and the comparison of the achieved score with the top, average and the lowest performers in the database. As the Knowledge Transfer process is based on process and functional Benchmarking, there was no need to develop specific sector values. The analysis can be limited to regional, national or international comparisons.

- **EFQM Score**. This option is similar to the performance analysis section. It displays the EFQM score for each of the elements of the EFQM model and calculates the total EFQM score for the company. The results are shown in a table.

- **Benchmarking Partner Search.** This option is employed to find potential Benchmarking partners that can learn from each other's strengths. This option uses the concept of "Win-Win Benchmarking" described in Section 3.2.6. The Benchmarking Partner Search option can be used to identify two companies that have "mirrored" performance levels in two elements of the EFQM Model. For example, the system can identify a company which is strong in "Leadership" and weak in "Customer Satisfaction", and a company which is weak in "Leadership" but strong in "Customer Satisfaction". These enterprises could learn from each other's better practices, and Knowledge Transfer could potentially occur between them as Figure 22. The Internet based Benchmarking Partner Search is a deliverable from this thesis as described in Chapter 1.

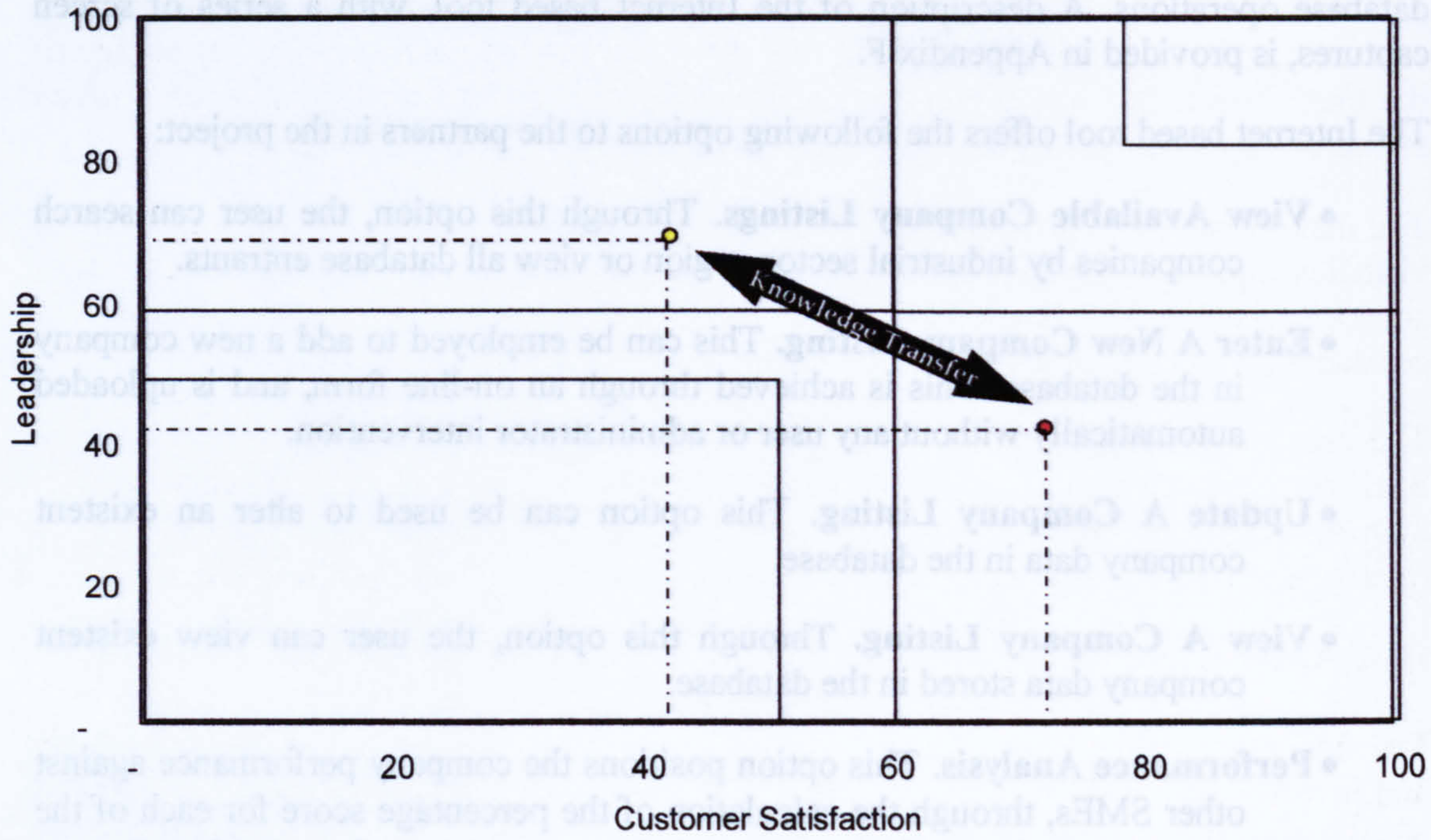


Figure 22: Benchmarking Partner Search and Win-Win Benchmarking

The first four options form standard database operations, while the performance analysis and EFQM score are employed for on-line analysis of data and provide the basis for the Benchmarking process. The Benchmarking partner search option is only used to identify companies who want to be benchmarked on a one-to-one basis, and is provided as an extra facility for the participant SMEs.

Performance Positioning

To position the performance of a company against other Small and Medium Enterprises, the performance analysis option of the Internet based tool is employed. Table 9 displays the output of the analysis

Specific Company		All Companies		
EFQM Criterion	Company Score	Minimum	Average	Maximum
1. Leadership	%	%	%	%
2. Policy and Strategy	%	%	%	%
3. People Management	%	%	%	%
4. Resources	%	%	%	%
5. Processes	%	%	%	%
6. Customer Satisfaction	%	%	%	%
7. People Satisfaction	%	%	%	%
8. Impact on Society	%	%	%	%
9. Business Results	%	%	%	%

Table 9: Performance Positioning Table

Through the above graph, the company performance scope (in percentage) can be assessed against the top, average and low scores within the database. The advantage of the process is that a participant company can find out if their performance on a given element is above or below average.

The maximum scores provide the profile of the "better than the performer" enterprise, a virtual company which has the best elements across all companies and signifies the best source of knowledge. For the Knowledge Transfer Framework, all comparisons were conducted with companies based in Bedfordshire.

The process is supplemented by using the Enablers versus Results graph to position a SME performance against other companies. The enablers and results graph also acts as a map of available expertise amongst the participant companies, which will identify a relative strength or weakness in their enablers or results against other companies.

Data Analysis and report Generation

The final stage of the Benchmarking process is conducted by the process administrator, and involves analysing the data attained through the performance positioning stage and presenting a short report to the company. The report is confidential and is handed to the company process champion or the manager of the company, at the Focus Group event.

6.3.2.3 Output

The Benchmarking process stage of the Knowledge Transfer Framework positions the performance of a Small and Medium-sized Enterprise against other companies. The administrator conducts the process and the results are provided to the company in the form of a confidential report during the Focus Group meeting.

6.3.3 Stage III: Focus Groups

6.3.3.1 Introduction

In the first stage of the Knowledge Transfer Framework, data was collected within the enterprise to assess its performance and through the second stage, the company performance was compared to other Small and Medium-sized Enterprises. The third step in the process is of high significance as Knowledge Transfer occurs at this stage. The Knowledge Transfer process is conducted through the establishment of Focus Group meetings.

Exchange theories are rooted in the domains of economics and social sciences. They are employed to explain and predict the maintenance or dissolution of relationships. Exchange theories assume that this occurs through a rational, decision making process that is based on simple cost-benefit analysis. For a relationship to be maintained certain criteria must be fulfilled (Wyatt, Evans et al. 1998):

- **Criterion A:** *Both parties must be at profit.* Profit (P) can be defined as the result of the relationship outputs (R_O) minus the relationship inputs (R_I). Therefore for both organisations it must be P>0 and hence (R_O-R_I)>0

- **Criterion B:** *Actual level of profit achieved (P_A) must be equal to or greater than the expected profits (P_E).* Therefore, $P_A \geq P_E$

- **Criterion C:** *Actual level of profit achieved (P_A) must be equal to or greater than the profit that could be achieved in alternative relationship (P_{ALT}).* Therefore, in mathematical terms $P_A \geq P_{ALT}$

- **Criterion D:** Not only individual profit levels are important, but also the acceptability of relative profit levels of both parties and any changes therein. Therefore, a company must be prepared to accept that they might not get as much out of the relationship in relation to their partner.

Exchange theory suggests that for a partnership to be successful, it must guarantee that all parties should obtain benefit out of the partnership and the partners anticipated expectations must be exceeded (Wyatt, Evans et al. 1998). The establishment of a partnership should assert that the attained benefit must be greater than that provided from alternative sources, and participants should acknowledge that the level of profit attained could not be the same for all parties. It is assumed that companies acknowledge that relative profits might not be equal, as the quantitative Enterprise Assessment scores of the participant companies will vary and improvement practices may not have the same profit levels for all enterprises.

The validation of the Knowledge Transfer Framework involved sourcing knowledge from better performing companies to humble performers. Initially, the author considered testing the framework through a Focus Group involving only two companies: the company that demonstrated a better practice and the not so good performer, under a common theme (such as Customer Satisfaction, or Leadership). The company displaying the superior performance will have limited benefit as Knowledge Transfer will be unilateral, from the better performer to the under-performer. The selection of a single theme amongst two-enterprises would not lead to the implementation of Win-Win Benchmarking, and might not satisfy the better performer expectations, nor exceed its alternate profit as described by Wyatt, Evans et al.

The author considered introducing various themes in the two-company Focus Group approach to enable the implementation of Win-Win Benchmarking. Each company would display superior performance at a specific/chosen theme, enabling bilateral knowledge transfer. The basis for this is that there is not a company or plant which is excellent at everything (Wiarda and Luria 1997). As both companies learn from each other's strengths, they can both exceed their expectations and attain benefits higher than alternate profit. Although the choice of various themes was preferable to a single theme as discussed above, knowledge availability would be limited to Better Practices amongst the two companies. Increasing the number of enterprises in the Focus Group would provide a larger resource of Superior Performances while implementing Win-Win Benchmarking. Krueger and Zikmund recommend that a Focus Group meeting should involve between six and ten members (Krueger 1994; Zikmund 1997).

The author did not consider the option of increasing the number of participants under the same Focus Group theme, as it would lead to unilateral Knowledge Transfer between the Superior performer and the under-performers.

The author decided that the approach that had more chances of ensuring the success of the Benchmarking partnership would be through the implementation of a Focus Group involving at least six enterprises with a variety of discussion themes. Companies would be able to engage in Win-Win Benchmarking within the group, and learn from better practices displayed by different companies. The researcher could guide the discussion so that a variety of themes would be covered, and Knowledge Transfer would be bilateral amongst all the participants.

The participants in the Focus Groups will be reasonably unfamiliar with each other as they are chosen based on their company's performance, and reasonably homogeneous as the companies are targeted within the manufacturing sector. The group discussion will be based upon conclusions drawn from the EFQM questionnaire qualitative data, and will be employed as a source of dissemination of superior practices from the better performer enterprises. As the topics will be carefully predetermined and sequenced, based on the analysis of the data, the discussion will be focused and monitored by the facilitator. All the above correspond to characteristics of a Focus Group, as discussed in section 2.2.6

The Focus Group discussions were discretely managed by the administrator, and the analysis was based on the discussion, participation, and comments from the company representatives. The author acting as the facilitator was aware of the limitations of the Focus Group approach, discussed in section 2.2.6, and aimed to minimise their affect on the output of the process.

The author used closed questions to obtain precise answers from participants. Examples of closed questions where the company representative had to provide illicit answers included: "How did your company introduce the Bonus-sharing scheme?" or "How do you assess employee performance?". In few cases, open questions were asked with the view not to influence the discussion, and it was aimed to involve everyone in the discussion as peoples attitude can vary with some being introverts while other being extraverts. Examples of open-ended questions used in the process include: "What do you think of initiatives such as Investors in People?" or "What do you believe the effect of the introduction of a Bonus Sharing Scheme has been for your business?". The purpose of the Focus Group implementation was to source and disseminate knowledge on how superior practices were achieved, and therefore the questions tended to be closed-ended as factual information was sought.

6.3.3.2 Process

The third stage in the Knowledge Transfer process is the implementation of the Focus Group meetings. The Focus Group process consists of four stages, which include: the preparation of the event, the identification of superior performances, the discussion on accomplishment of superior performances, and finally the implementation of improvements within the enterprises.

The Preparation Stage

The requirement for the Focus Group establishment was to obtain between 6 and 10 participant Small and Medium-sized Enterprises. To achieve this, invitations to participate in the group must be sent to at least 10 companies. The enterprises that undertook the assessment process have agreed to participate in a Focus Group meeting, and therefore the response rate of the companies accepting to participate in the event is anticipated to be high. No prior research in the profiles of the companies is required, as the Focus Group meeting will be structured based on the superior performance expertise available between the enterprises. It is not necessary to compare against the best enterprise, but against an enterprise which displays better performance in a specific area.

An invitation letter must be sent out to the companies to participate in the event, denoting that upon their participation they will receive their Benchmarking report which was prepared in the second stage of the Knowledge Transfer process. Upon completion of the list of participant companies, the next step forms the identification of the better performing companies based on both the qualitative and quantitative data received through the assessment stage, leading to the establishment of the discussion topics of the Focus Group meeting.

Identification of Superior Performances

A key element of the Focus Group process is to identify the sources of better practices amongst participant companies. The process is conducted in two steps. The first involves finding the companies that obtained the maximum performance values for each of the 26 sub-groups of the questions of the EEFQM questionnaire, and the second involves a prioritisation of the sub-elements.

The prioritisation of the 26 sub-elements is conducted through the maximum score that can be obtained under each area of the EFQM model. For example, all the sub-elements of "Customer Satisfaction" are given highest priority considering that Customer Satisfaction can obtain the highest score amongst all the elements, as outlined in Chapter 3. EFQM model element prioritisation is conducted in descending order of maximum score for each element and is shown in Table 10.

EFQM Element	Max. Score	Sub-Element	Priority
Customer Satisfaction	200	6a, 6b, 6c	1
Business Results	150	9a, 9b	2
Processes	140	5a, 5b, 5c, 5d	3
Leadership	100	1a, 1b, 1c	4
People Satisfaction, Resources, People Management	90	3a, 3b 4a, 4b, 4c, 4d 7a, 7b, 7c	5
Policy and Strategy	80	2a, 2b, 2c	6
Impact on Society	60	8a, 8b	7

Table 10: EFQM Element Prioritisation

The selection process defines the best performing enterprises in every sub-element ranked in sub-element order of importance. The ideal situation is that every company amongst the participant enterprises would be identified as the best performer in at least one of the 26 sub-element. This case would lead to the establishment of a number of discussion topics equal to the participant companies, where every company would learn from others and disseminate their superior performance knowledge. However, this might not be achievable every time, and therefore, the general rule is to aim is to have the highest possible number of participant SMEs discussing about how they achieved superior performance.

Prior to the meeting, the companies identified as better performers where invited to present for about 5 to 10 minutes what is their better practice and how did they achieve it. The companies must be sent a list of participants, and must be provided with the opportunity to withdraw from the event or from any discussions concerning their performance, in case they feel that this will cause threat to their business. In this manner, competitors can attend the Focus Group meeting, and learn from other practices, without disclosing any information about their operation.

Accomplishment of Superior Performances

This section involves the implementation of the Focus Group meeting. The facilitator with the participant SMEs, represented by the process champions, establish the Focus Group, at the specified place. Prior to the start of the meeting, each company representative receives a copy of the Benchmarking report sealed in an envelope.

It is advantageous to have a coffee session prior to the event, so company representatives can become familiar with each other. At the start of the meeting, participants must be provided with the opportunity to introduce themselves to other SME representatives, and provide some background information about their company.

The facilitator must explain the purpose of the meeting and remind the companies of the steps taken up to the establishment of the Focus Group meeting. At the first part of the event, the facilitator must conduct a short presentation of the Benchmarking data. Companies will be able to compare their performance against the given data through the use of the Benchmarking report.

At the second stage of the meeting, companies are invited to talk about the how they obtained superior performance. The facilitator has carefully planned the event, and after a brief introduction of the discussion area, the selected company representative is invited to discuss for about 5 to 10 minutes about the nature of their best practice and how it was achieved. Following the brief informal outline, a session of about 20 minutes follows with questions from the other companies. If there is inertia between the group, the facilitator must ask the first question, to lead to questions being raised from the participants. The process is repeated until all the topics of discussion are covered. It must be stressed that the ownership of the event lies with the companies, and the facilitator is present to maintain a reasonable focus on the discussions.

The Focus Group meeting places emphasis on what is identified as better performance and how it was achieved. The process provides the opportunity for participant enterprises to learn from the superior performers and obtain task defined specific

solutions on how to improve their performance. The aim of the event is to source improvement solutions from the better performing companies.

Implementation

The enterprise champions must communicate the Benchmarking and Knowledge Transfer findings widely within their enterprise and ensure that there is top management commitment to implement any changes. A discussion forum or internal meeting should be initiated to discuss the facts, and the findings from the Knowledge Transfer effort.

As a first step towards the prioritisation of the improvement tasks, the companies were advised to filter which tasks were perceived to be of critical importance to their business. Upon selecting which improvement tasks are linked to their critical success factors, enterprises were invited to employ with the ease and effect graph, shown in Figure 23.

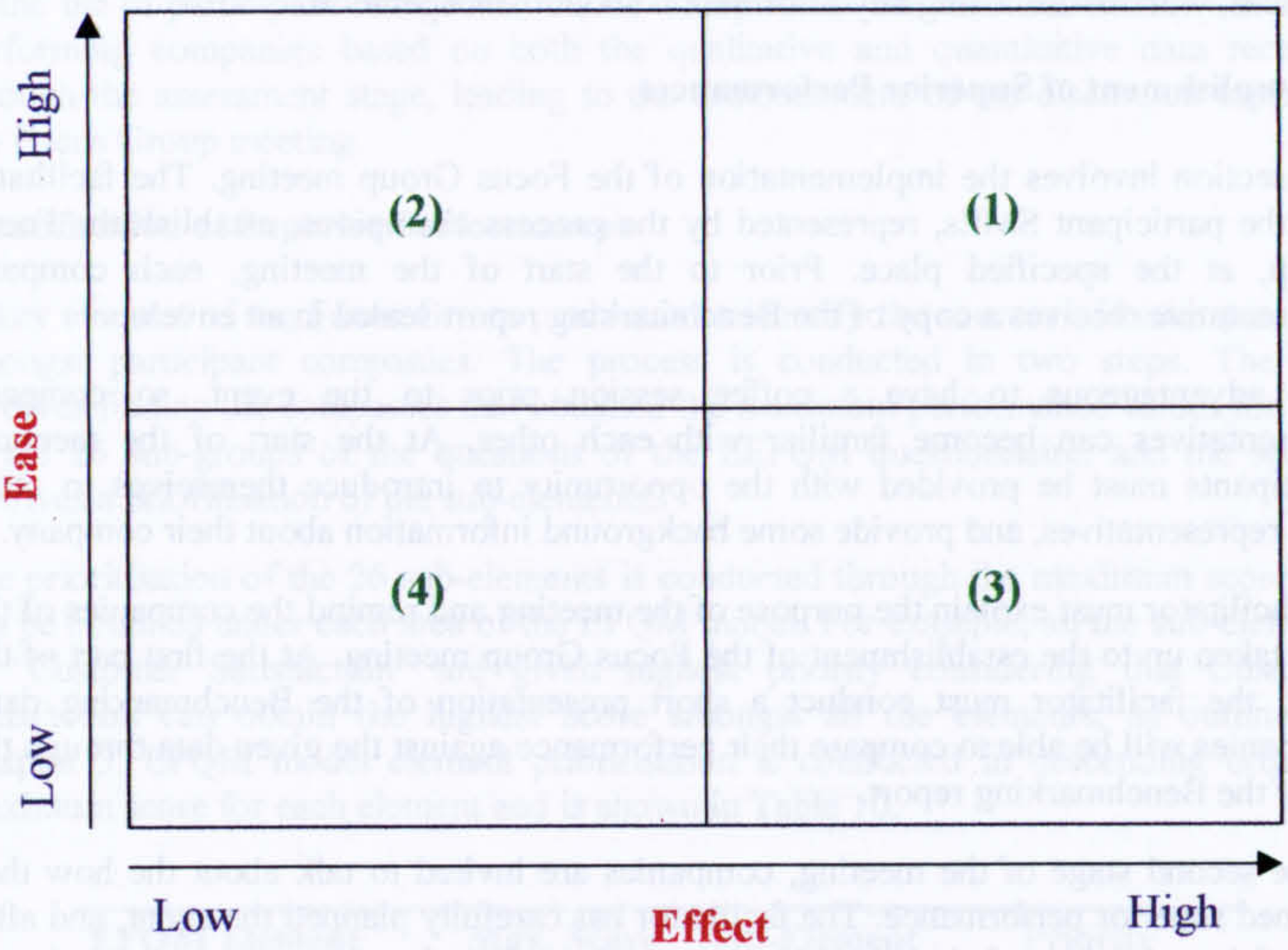


Figure 23: The Ease and Effect Graph

The ease and effect graph prioritises the improvement methodologies based on the ease of implementation and on the anticipated effect. Tasks that are placed on the first quadrant are easy to implement and provide high effect to the improvement of the business performance and should be the first to attempt. They should be followed by the implementation of the tasks in the third and second quadrants, as the effect on business performance is of higher importance than the ease of implementation. Finally, tasks that are both difficult to implement and have low effect on the business performance should be abandoned, as the benefit would be insignificant compared to the effort invested.

Ideally, the author would follow the implementation of the improvement methodologies inside each of the participant enterprises. However, the investigation of the implementation activities inside the enterprises was not the focus of the research.

The best results from Knowledge Transfer initiative can come from organisations that building a cohesive and continuous change process. Participant enterprises must be encouraged to have their performance re-assessed and repeat the process after a period of time to assess developments and encourage continuous improvement.

The Focus Group meeting can occur between companies from different countries with the presence of translators, hence allowing Knowledge Transfer to surpass national boundaries. The presence of the experienced facilitator, provides an additional element for control in the process and full confidentiality is ensured for participant enterprises that do not wish to disclose their performance levels or best practices. The Focus Group meeting aims at disseminating superior performance and does not aim to expose weak performing enterprises.

6.3.3.3 Outcomes

The Focus Group stage of the Knowledge Transfer Framework has two principal outputs:

1. Identifies what are the better practices and provided superior performance knowledge sourcing opportunities
2. Participant enterprises can obtain task defined specific solutions to improve their business performance.

The outcomes are provided to the enterprise through the Focus Group discussion. The aim of the process is to assist Small and Medium-sized Enterprises improve their performance through knowledge transfer.

6.3.4 Summary

The integration of Self-Assessment, Benchmarking and Focus Groups provides the baseline for the establishment of a powerful business improvement framework. It provides diagnostic appraisal, and task defined specific solutions embracing better practices and innovative advances. The framework enables a company to take small steps towards business excellence, and learn from the companies, which have better practices, and addresses the SME Knowledge Deficit. The Knowledge Transfer Framework has been designed in accordance to the needs of the Small and Medium-sized Enterprises analysed in Chapter 5. Chapter 7 presents the practical application and validation of the framework.

6.4 The Benchmarking Scope

The literature review in the Section 4.5 indicated that there is a lack of Benchmarking models and tools that provide enterprises with information on how to improve based on non-outdated data. To classify various Benchmarking initiatives in terms of their impact on business improvement, the author conceived the Benchmarking Scope Diagram.

The Benchmarking Scope indicates the scope of perceived shift in Benchmarking objectives from Performance Measurement, through Performance Positioning and now Knowledge Transfer leading to structured Business Improvement, shown in Figure 24.

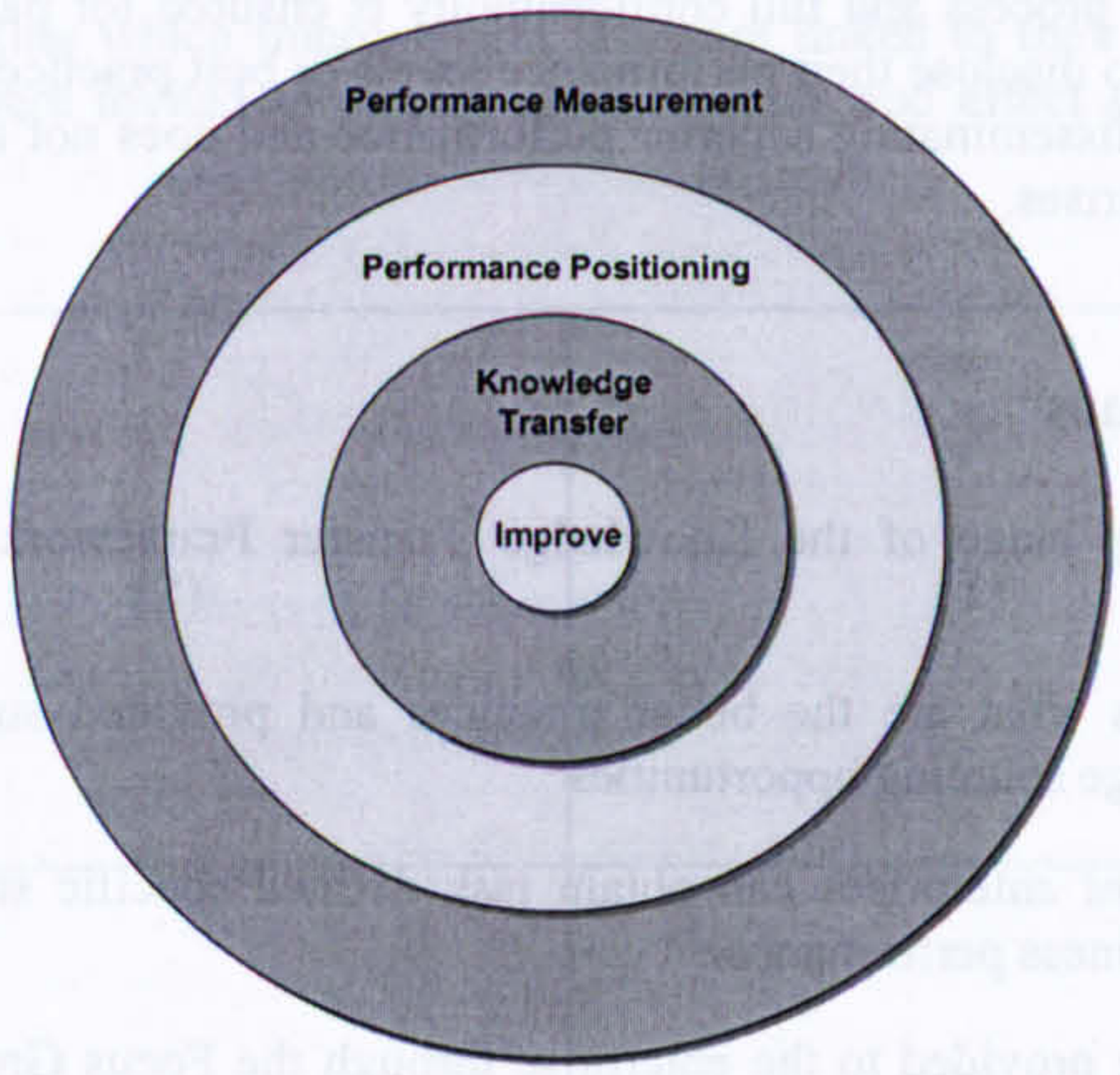


Figure 24: The Benchmarking Scope

The majority of classical Benchmarking approaches are limited to Performance Measurement and comparisons and are therefore constrained to the outer regions of the Benchmarking Scope. Moving into the centre of the target, the emerging generation of Benchmarking application techniques offers exciting opportunities for the controlled realisation of Better Practice.

The Benchmarking Scope can be employed as a mapping mechanism for comparison of Benchmarking initiatives, and is a deliverable of this research. Figure 24 demonstrates how the Benchmarking initiates for Small and Medium-sized Enterprises discussed in section 4.5, can be mapped on the Benchmarking Scope.

All the initiatives outlined in section 4.5 provide performance-positioning information as they involve direct and in-direct Benchmarking comparisons. In addition all the initiatives with the exception of Inside UK Enterprise (IUKE) involved a Performance Measurement System in the form of an audit questionnaire (either in hard or soft copy format) that the SME had to complete. The Inside UK Enterprise involves an informal

Performance Measurement system, where companies chose a specific area where they want to explore through exemplar enterprises based on their perception of which areas they underperform.

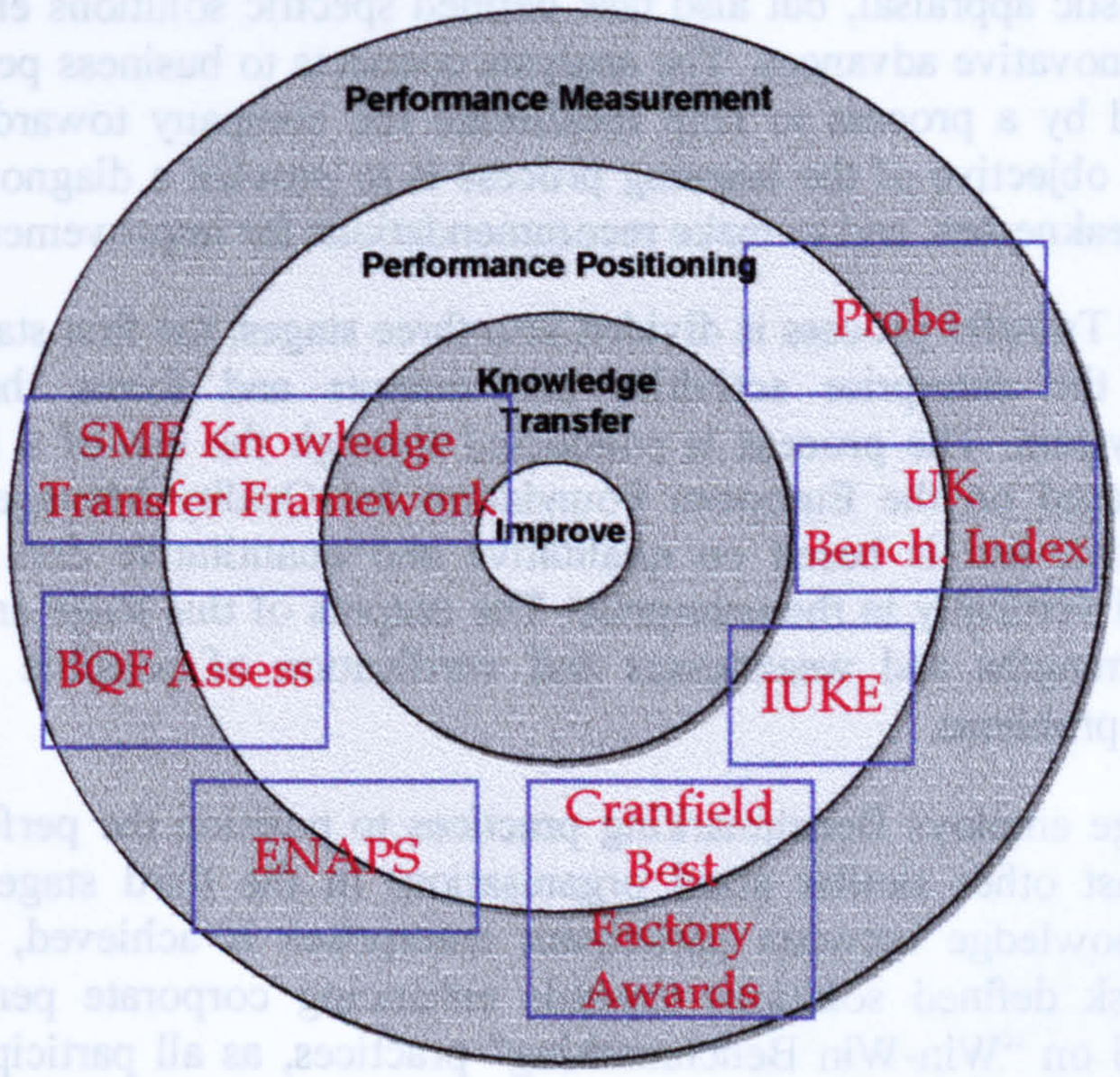


Figure 25: Mapping the Benchmarking Scope

As discussed in Chapter 4, the outlined Benchmarking initiatives do not involve Knowledge Transfer from better performing enterprises. The SME Benchmarking Knowledge Transfer Framework Process advances one step further and extracts knowledge from the better performer enterprises to provide task defined solutions which could improve the performance of under-performing enterprises.

The SME Benchmarking Initiatives presented in Figure 25, are in-directly providing assistance to the company concerning the internal implementation to the enterprise of improvement tasks and activities, and are subsequently not involved in internal change management process. The implementation of the improvement tasks is either conducted by the enterprise or through consultants or agencies that collaborate with the providers of the Benchmarking service.

6.5 Conclusive Remarks

This Chapter provided a description of the SME Knowledge Transfer Framework. The development of the framework was based on the requirements presented and discussed in Chapters 2, 3, 4 and 5. The mapping of Benchmarking as a Knowledge Transfer and improvement process provides the baseline for a business improvement tool, providing not only diagnostic appraisal, but also task defined specific solutions embracing better practices and innovative advances. The analysis connects to business performance, and is supplemented by a process to help recalibrate the company towards best practice excellence. The objective of the learning process is to provide a diagnosis of company strengths and weaknesses, and to make recommendations for improvement.

The Knowledge Transfer process is divided into three stages, the first stage involves the assessment of the enterprise activities and outputs and forms the Performance Measurement system. The process is conducted through the use of a self-assessment questionnaire based on the European Foundation for Quality Management Business Excellence Model, and is based on qualitative and quantitative data collected both horizontally and vertically in the enterprise. The outputs of this stage are identification of enterprise strengths and weaknesses and verification of possible intra-enterprise communication problems.

The second stage employs Benchmarking practices to position the performance of the enterprise against other similar sized organisation. In the third stage, bi-directional exchange of knowledge between participant enterprises is achieved, leading to the provision of task defined solutions towards enhancing corporate performance. The process is based on "Win-Win Benchmarking" practices, as all participant enterprises can attain knowledge on how superior performance practices were achieved. The framework is developed to confront the Knowledge Deficit in Small and Medium-sized Enterprises, and is a research deliverable, as outlined in Chapter 1.

To classify various Benchmarking initiatives in terms of their impact on business improvement, the author conceived the Benchmarking Scope Diagram. The Benchmarking Scope is employed to indicate the scope of perceived shift in Benchmarking objectives from Performance Measurement, through Performance Positioning and Knowledge Transfer leading to structured Business Improvement, and is a deliverable of the research, as presented in Chapter 1.

Chapter 7: Implementation

7.1 Synopsis

This purpose of this Chapter is to describe the successful implementation of the SME Knowledge Transfer in an industrial environment. The framework was applied in a portfolio of selected Small and Medium-sized Manufacturing Enterprises from diverse industrial sectors.

7.2 Approach

The Knowledge Transfer Framework was implemented and evaluated through Small Manufacturing Enterprises in the region of Bedfordshire in the United Kingdom. The author established a set of selection criteria for the selection of the enterprises which were:

- **Criterion 1**: *"Small Enterprises"*, as defined in Table 3. Although the Knowledge Transfer Framework was developed to target all SMEs, the author felt the smaller companies were more affected by the Knowledge Deficit, owing to their more limited human and financial resources, in comparison to larger sized SMEs
- **Criterion 2**: *"Manufacturing Related"*. Participant enterprises should be directly involved in the manufacturing sector by producing their own products or indirectly involved by servicing manufactured products.
- **Criterion 3**: *"High Uncertainty"*. Participant enterprises should operating in a high uncertainty market, or a niche market, with a high proportion of their sales dependent on few customers

- **Criterion 4**: *"High Complexity"*. Participant enterprises should be offering customised product or services to their customers, imposing high complexity in their production or servicing process

- **Criterion 5**: *"Appropriate Culture"*. Participant enterprises must be willing to disseminate better practices, be receptive to new knowledge, be willing to try different practices, and their management must be fully committed to the Knowledge Transfer Framework. In short, the enterprises must have the appropriate culture to take advantage of the process.

The author selected ten enterprises from a list of beneficiary enterprises of the ADAPT-CORE project, following a discussion with the ADAPT-CORE project manager on the suitability of each enterprise based on the five selection criteria. The ADAPT-CORE project manager has visited all enterprises and provided the author with a Needs Analysis report for each of the enterprises.

Different enterprises from those in the development phase of the framework were selected by the author, to avoid any preconceptions concerning the enterprise influencing the process. The Needs Analysis, which was not conducted by the author, provided information concerning the nature of their manufacturing process, identified that they operated in high uncertainty/high complexity environments, and that they were small sized enterprises. The selection process, at this stage, was based on satisfaction of the first four criteria.

Upon identification of the potential participants, the author requested the ADAPT-CORE project manager to contact the enterprises. The aim of the project manager contacting the enterprise, was to present the Knowledge Transfer Framework as an additional complementary service and encourage their participation. Considering that the selected SMEs were beneficiaries of subsidised training under the project, the author felt that there was limited probability of refusal.

The interested enterprises were subsequently contacted by the author, to briefly present the process and arrange a first introductory meeting. During the first meeting, the author assessed the enterprises to determine that they had the appropriate culture to participate in the process, satisfying the fifth criterion.

Seven of the participant enterprises are directly involved with manufacturing, and the remaining three are indirectly related to manufacturing through their specialisation in servicing and repairing electrical or mechanical equipment. The service enterprises do not manufacture their own products but exhibit a strong engineering background, as they employ qualified engineers to perform product or component repairs.

Background information about the participant enterprises is shown in Table 11, based on 1997 figures.

Company Code	Number of Employees	Turnover (£)	Classification Description
Ukhit	18	892,000	Manufacture of Precision Systems
Ukmit	30	1,172,000	Manufacture of Electronic Valves
Ukecs	25	1,200,000	Service and Repair of Electronic Equipment
Ukdag	49	1,200,000	Manufacture of Electronic Valves
Ukind	17	800,000	Manufacture of Electronic Instruments
Ukrin	25	1,500,000	Manufacture of Metal Products
Ukhar	45	3,653,000	Service and Repair of Power Supply Generators
Ukjan	16	347,000	Service and Repair of Electronic Equipment
Ukdut	29	1,814,000	Manufacture of Precision Systems
Uklep	25	831,000	Manufacture of Pattern Makers

Table 11: Participant Enterprises Background Information

7.3 Implementation

7.3.1 Overview

The framework was realised through ten Small and Medium-sized Enterprises case studies. All enterprises participated in the assessment and Benchmarking stages, eight enterprises participated in the Focus Group meeting. The author developed and delivered the methodology in all companies. The only actions, which the author was not directly involved in, are the data collection process under the enterprise assessment stage, and the improvement task implementation following the Focus Group meeting.

The enterprises were targeted under the umbrella of the ADAPT-CORE Programme, a European Social Fund programme aiming to improve the efficiency and effectiveness of European Small and Medium-sized Enterprises.

Table 12 illustrates which part of the implementation methodology was applied and evaluated at each site. For confidentiality reasons, all company names have been abbreviated.

	Ukhit	Ukmit	Ukecs	Ukdag	Ukind	Ukrin	Ukhar	Ukjan	Ukdut	Uklep
Assessment										
1. Introduction	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
2. Establish Process Champion	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
3. Present Questionnaire	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
4. Data Collection	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
5. Data Analysis	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
Benchmarking										
1. Data Storage	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
2. Performance Positioning	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
3. Data Analysis	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
Focus Group										
1. Preparation	☑	☑	☑	☑	☑	☑	☑	☑		
2. Identification of Superior Performance	☑	☑	☑	☑	☑	☑	☑	☑		
3. Discussion on Accomplishment of Superior Performance	☑	☑	☑	☑	☑	☑	☑	☑		
4. Implementation	☑	☑	☑	☑	☑	☑	☑	☑		

Table 12: Participant Small and Medium Enterprises

All the enterprises were fully committed to the Benchmarking process and participated in the assessment and Benchmarking stages of the Knowledge Transfer Framework. Two companies did not attend the Focus Group meeting owing to other engagements of both the managing director and the process champion, and they all requested to participate in future events.

The implementation process of the first two stages of the Knowledge Transfer Framework is presented through a case study. All ten enterprises underwent the enterprise assessment and Benchmarking process in the same manner, the only differentiation amongst all companies were the number of questionnaires returned for the enterprise assessment stage, and the results of the data analysis. The process has been implemented to both manufacturing and service enterprises, operating at high uncertainly markets, with products and services which can be characterised as highly complex. All the enterprises were customising their products for their customers and were producing in small batches. Large proportion of the enterprises were engaging into fire-fighting mode to solve problems which could be eliminated through better planning and control in their business operation and production.

All the companies were willing to change their current practices to adopt new methodologies which would lead to increased productivity and higher operating effectiveness. Top management commitment was ensured and managers were encouraging employees to participate in the process. All companies had the appropriate culture to participate in the process: they were willing to change and to invest time and effort in throughout the process.

7.3.2 Stages I and II: Case Study

In this section, the enterprise assessment and Benchmarking stages are presented for a manufacturing enterprise based in Bedfordshire, which took part in the Knowledge Transfer process. All ten participants underwent the same process. The Company was chosen to demonstrate the successful application of the Knowledge Transfer Framework in the small enterprises.

7.3.2.1 Background Information

The Company produces niche and bespoke products for a specialist market, and was founded 14 years ago. It is partly owned by a large multi-national enterprise specialising in instrumentation. They employ 18 full time employees, have an annual turnover of almost nine hundred thousand pounds, and are expected to surpass the one million-pound turnover in the year 1998/1999.

The Company manufactures and designs in-house a wide range of measurement equipment, including process oxygen and gas analysers, food packaging and produce storage analysers, area gas monitoring systems, custom designed analysers and various sampling systems. New product development is conducted in-house, and some of the components are outsourced to local suppliers.

The qualitative data collection indicated that the Company is very well organised. They kept records for every business transaction dating back to the establishment of the enterprise, have invested in Information Technology systems, and are highly customer focused. The manager noted that "to survive, the Company not only satisfy the customer, but delight them, priority is placed on delivering the right product, at the right specifications, at the right time, in the right price for the customer and for the enterprise".

7.3.2.2 Stage I: Enterprise Assessment

The Knowledge Transfer Framework is provided as a complementary service to enterprises that participate in the Needs Analysis element of the ADAPT-CORE project. The considered enterprise agreed to take part in the process following an initial discussion with the CORE project manager on the services offered by the project. The Company details were forwarded to the author, who contacted the enterprise to arrange an introductory meeting to provide the enterprise with a detailed description of the process and provide the possibility to the Company to withdraw their interest if required.

Introduction Meeting Process

The author, hereafter defined as the process administrator, visited the enterprise to establish the introductory meeting. Present in the meeting were the administrator, the

managing director and the manager of business accounts also responsible for personnel management and business improvement activities. The administrator presented the stages in Knowledge Transfer process, the benefits it can offer to the business through the various deliverables and the requirements of the enterprise. Emphasis was placed on the use of the framework for business improvement.

Establish Process Champion

The enterprise accepted to take part in the process and full management commitment in the implementation of the framework was provided. The business accounts manager accepted the responsibility of becoming the process champion, and managing the internal data collection process. Although she did not have a quality management related background, she was actively involved in business process improvement practices since the establishment of the Company in 1984.

Present EFQM Questionnaire

The next stage in the process involved presenting the data collection questionnaire to the process champion. The managing director was not required to be present at this stage, and was not involved in this process. As the process champion was not aware of the European Foundation for Quality Management Business Excellence Model, the administrator presented the EFQM model and described how it is employed to assess business performance in terms of both company operations and results achieved.

Following the introduction to the EFQM model, the enterprise assessment questionnaire was presented. The administrator went through all the assessment questions, provided clarifications were required, and provided information on how to complete the questionnaire using the boxes provided.

The data collection methodology was outlined during the introduction meeting by the administrator, emphasising the requirement to collect data from both the management team and the shop floor, to ensure both horizontal and vertical data representation. The administrator noted that best way of conducting the process is gathering the employees for a five minute meeting led by the process champion with the presence of the managing director. During the meeting, the champion would explain the importance and purpose of the process, distribute the questionnaires to the employees, provide guidelines on how to complete the questionnaire and establish a return date. This meeting could be arranged without the presence of the process administrator.

Data Collection

The next stage formed the data collection process. The quantitative data was collected internally in the enterprise without any intervention from the administrator. The questionnaires were handed out to 10 employees who attended the meeting organised by the managing director and the process administrator, and all participants were requested to return the completed questionnaire within a weeks period.

The administrator collected the qualitative data following the introductory meeting. This was achieved though an interview session with the process champion, a plant tour and a brief discussion with personnel on the design and production departments. A copy of the interview questions asked to the process champion is attached in Appendix E.

All the EFQM questionnaires were collected by the champion, who indicated for each dataset whether it was received by managerial or shop-floor staff, and forwarded them to the administrator by registered post, leading to the data analysis stage of the enterprise assessment process. A total of 9 questionnaires out of 10 were received in the considered timeframe.

Data Analysis and Report Generation

Upon receipt of the questionnaires, the administrator inserted the data in a spreadsheet, and calculated the average values for each of the questions, as shown in Figure 26 for the Leadership section of the EFQM model. Although the administrator requested that all questionnaires be completed anonymously, the staff and the management of the enterprise agreed to identify themselves by noting their names on the questionnaires.

	LEADERSHIP	Person 1	Person 2	Person 3	Person 4	Person 5	Person 6	Person 7	Person 8	Person 9	Average
1.a.	The management team is clearly engaged in leading the process of implementing total quality.										
	The management team shows clear and open communication with its workers.	75.0	25.0	70.0	75.0	70.0			70.0	60.0	63.6
	The management team leads by example, and follows the principles of quality.	60.0	50.0	70.0	60.0	30.0			50.0	40.0	51.4
	Managers provide training to their workers.	35.0	10.0	30.0	40.0	30.0			30.0	10.0	26.4
	Managers undergo frequent training.	5.0	5.0	10.0	10.0	10.0			30.0	10.0	11.4
1.b.	The orientation of all management activities is wholly consistent with the principles of total quality (client satisfaction, management based on facts rather than intuition, continuous improvement, involvement of all personnel, active leadership)										
	The management team assesses employee awareness with regard to total quality.	35.0	30.0	50.0	20.0	50.0			50.0	24.0	37.0
	The management team takes part in reviewing quality progress.	80.0	100.0	70.0	80.0	70.0			70.0	70.0	77.1
	The management team always appreciates the efforts made by individuals and teams.	85.0	75.0	30.0	85.0	50.0			70.0	80.0	67.9
	The management team acknowledges the achievements of individuals, teams, clients and suppliers.	80.0	50.0	30.0	81.0	50.0			70.0	70.0	61.6
1.c.	The company's management provides active leadership towards total quality.										
	The management provides the necessary resources and support for improvement activities.	50.0	75.0	50.0	58.0	10.0			70.0	30.0	49.0
	The management takes initiatives to meet with clients in order to understand and satisfy their needs.	50.0	90.0	50.0	55.0	50.0			70.0	30.0	56.4
	The management takes initiatives to meet with suppliers in order to understand and satisfy their needs.	50.0	50.0	50.0	65.0	50.0			50.0	30.0	49.3
	Managers personally participate in activities designed to promote total quality outside the company.	50.0	-	30.0	50.0				70.0	30.0	38.3

Figure 26 : Calculating the Percentage Score

Some of the employees did not fill in any of the boxes in some questions, indicating either unawareness of the answer or unawareness of the process, signifying a potential gap within the enterprise information flow. The calculated average values are considered as the consensus percentages for the enterprise. The next step involved calculating the percentage difference for each of the individual answers from the average value for each question, shown in Figure 27, for the Leadership section of the EFQM model.

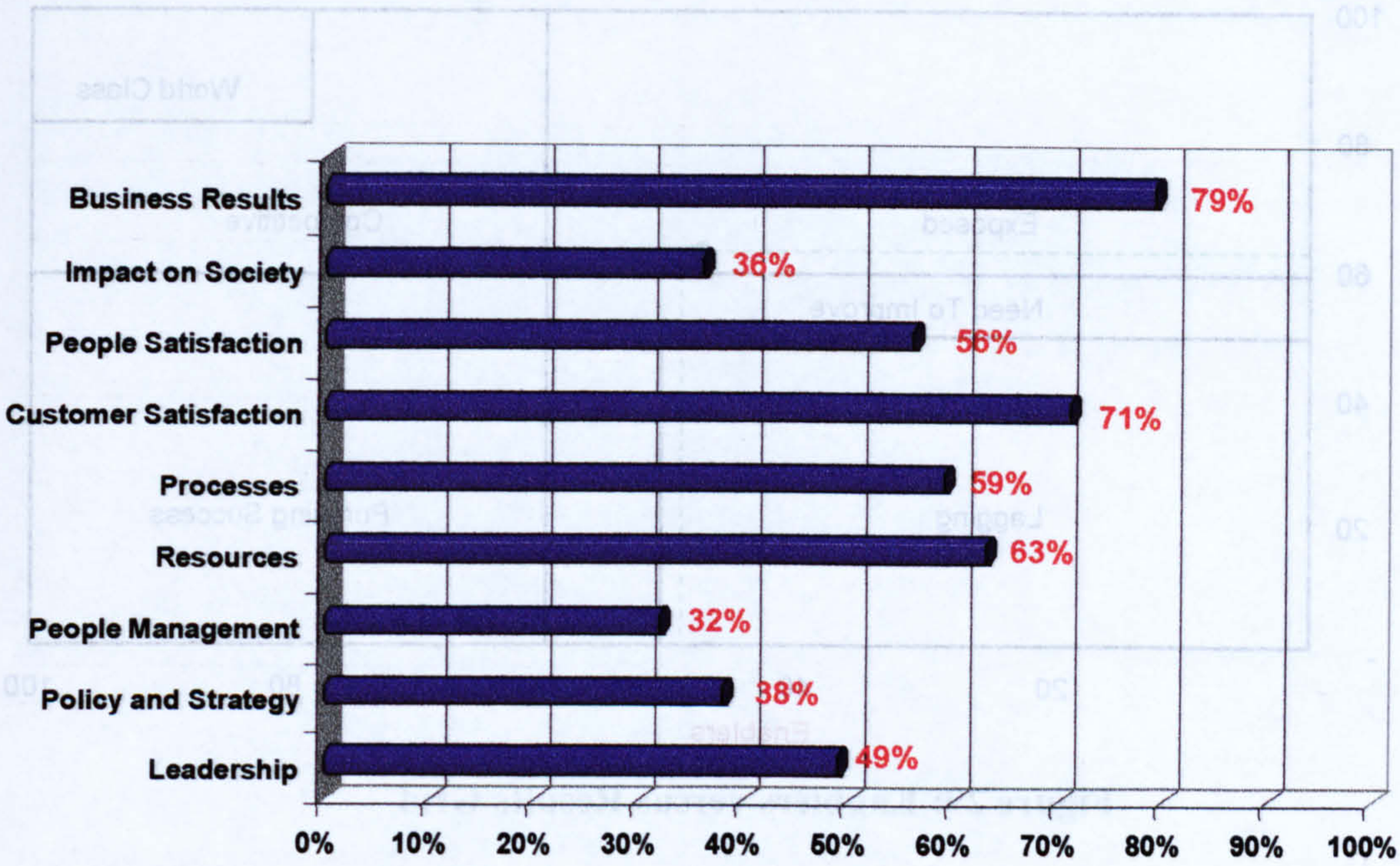


Figure 28: Congregate Enterprise Average Score

In Chapter 5, it was described that a company with a score above the 60% mark is considered as a good performer, while a score below 50% was considered as low performer. A percentage score between 50% and 60% identifies that there is a need for improvement, and performance can be characterised as average.

The average percentage score (for all the elements of the EFQM model, for the considered manufacturing enterprise) was 54%, identifying the enterprise as an average performer with areas for improvement. The Company's strengths were business results, customer satisfaction, followed by resources and processes. People satisfaction achieved an average performance of 56% and leadership was considered an area for improvement, with a score of 49%. The underperforming areas were policy and strategy, people management and impact on society.

The Enablers versus Results graph was employed to characterise the enterprise in terms of its performance, and is shown in Figure 29.

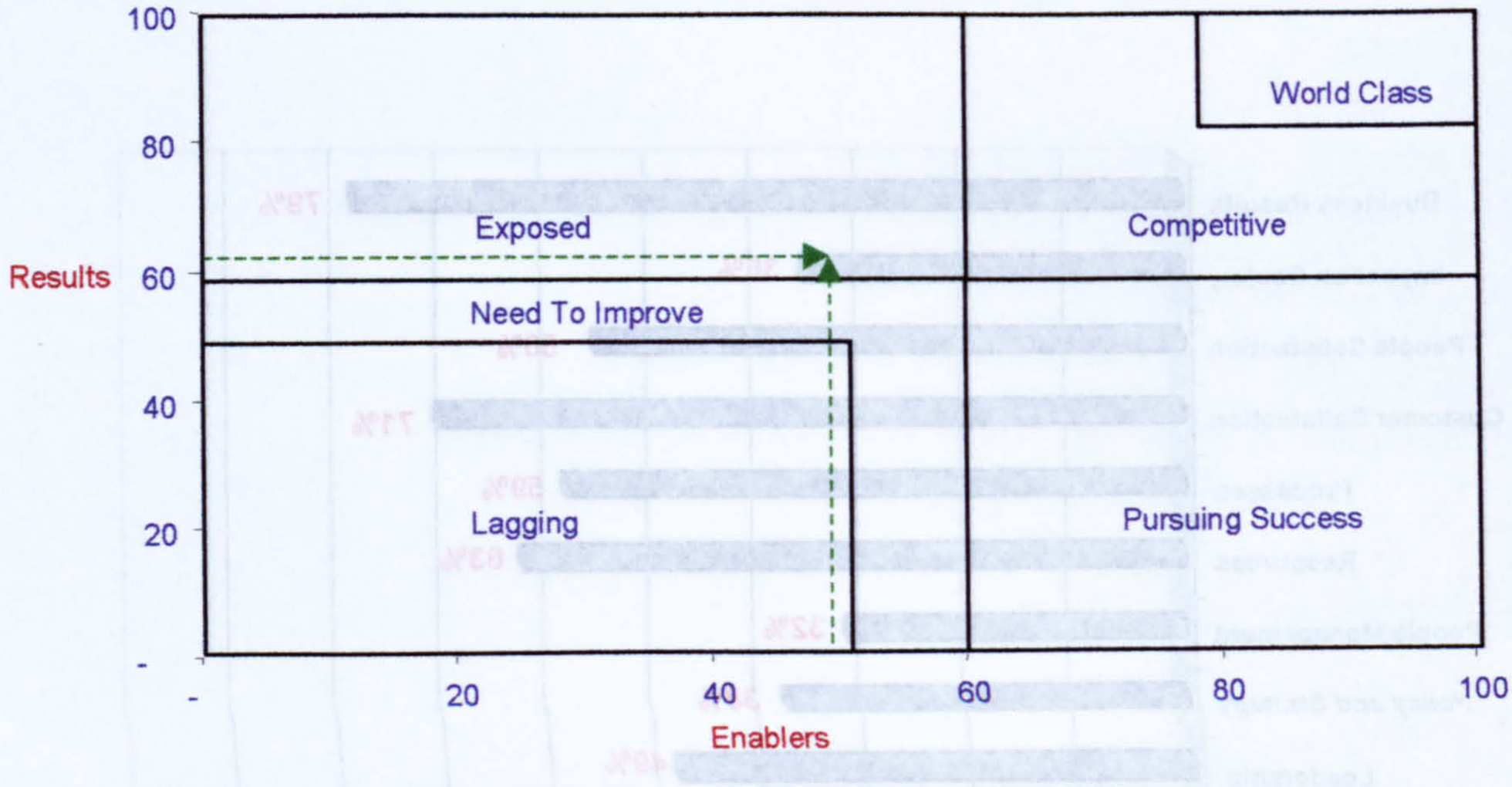


Figure 29: Enablers versus Results Grid

The average value for the Enabler elements of the EFQM model was 48% and 61%for the Results, classifying the Company as relatively "exposed" as it is close to the boundary of the exposed region of the grid. Although the enterprise was achieving good results, there was scope for further improvement in the enabler elements. The Company seemed effective at its results but not efficient enough in the way results were obtained.

Emphasis was not placed on the EFQM score of the companies, as the process was not based on award assessment practices as described in Chapter 5. However, the EFQM score for the participant enterprises is calculated for information purposes only. In this case, the scores for each element of the EFQM Business Excellence Model, rounded to the nearest integer, are shown in Table 13.

EFQM Score Analysis	Point Score
Leadership	49
Policy and Strategy	31
People Management	29
Resources	56
Processes	83
Customer Satisfaction	142
People Satisfaction	51
Impact on Society	22
Business Results	119
Total Score	**582**

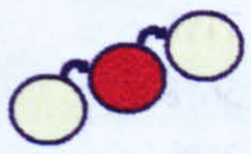
Table 13: Enterprise EFQM Score

At the end of the analysis stage, a brief report to the Company was generated, shown in Appendix G. The report was handed back to the enterprise by the administrator and

presented to the champion in a meeting arranged at the Company site. The report incorporated the above mentioned tables and graphs, which were employed to identify the strengths and weaknesses, followed by the areas of possible communication gaps.

The key findings were presented and a discussion followed on the strengths and weaknesses of the enterprise. The release of the report to the enterprise marked the end of the enterprise assessment stage and led to the second stage of the Knowledge Transfer methodology: the Benchmarking process.

7.3.2.3 Stage II: Benchmarking



The Benchmarking process was conducted by the administrator and did not involve any further data collection within the enterprise.

Data Storage

The first step in the process was to store the data in the company database. Through an Internet browser, the administrator connected to the ADAPT-CORE Benchmarking database homepage. The database operations can be accessed through a successful login using a username and password, which the author distributed to all the ADAPT-CORE partners acting as process administrators for the Knowledge Transfer Framework.

The data was uploaded in the database using the option "Enter a New Company Listing", and was immediately available to all the project partners in both Germany and Spain. The database operations are shown in Appendix F.

Performance Positioning

The performance positioning process was conducted using the "Performance Analysis" option from the main database menu, which provides the performance-positioning table.

The enterprise performance was compared against other participant SMEs and more specifically against the best, average and lowest percentage score obtained across all participant enterprises. The performance positioning table is based on traditional Benchmarking practices, positions the enterprise performance in relation to other enterprise performance data, and provides participant SMEs with an overview what performance standards similar sized enterprises have obtained in any area of the EFQM model.

The performance positioning table is displayed automatically through the internet based database tool, and is shown in Table 14.

Specific Company		All Companies		
EFQM Criterion	***Company Score***	***Minimum***	***Average***	***Maximum***
1. Leadership	49%	18%	45%	60%
2. Policy and Strategy	38%	19%	40%	57%
3. People Management	32%	10%	35%	53%
4. Resources	63%	38%	49%	64%
5. Processes	59%	36%	60%	71%
6. Customer Satisfaction	71%	45%	59%	71%
7. People Satisfaction	56%	13%	45%	56%
8. Impact on Society	36%	10%	39%	58%
9. Business Results	79%	16%	49%	79%

Table 14: Performance Positioning Table

The enterprise obtained the highest score amongst all participants in the areas of business results, customer satisfaction and people satisfaction, and was very close to the best performer in the resources criterion of the EFQM Business Excellence Model. The enterprise obtained a close and above the average score for the leadership, while an almost average value for the processes criterion. Finally, close but below to the average were the values for policy and strategy, people management and impact on society. The minimum, average and maximum performance scores were obtained from SMEs from the region of Bedfordshire in the United Kingdom.

The analysis indicated that the Company is amongst the better performers and it achieved almost the top scores in four out of the nine elements of the EFQM model, amongst the ten participant enterprises. However, areas for improvement were identified to be once again policy and strategy, people management and impact on society. The Company performance was not compared against other companies bearing the same industrial classification, as better practices were sourced at any industrial sector, through functional or generic Benchmarking.

The process was supplemented through the use of the Enablers and Results Graph, which positioned the Company performance against other participant SMEs, shown in Figure 30.

	LEADERSHIP	Person 1	Person 2	Person 3	Person 4	Person 5	Person 6	Person 7	Person 8	Person 9
1.a.	The management team is clearly engaged in leading the process of implementing total quality:									
	The management team shows clear and open communication with its workers.	11	-39	6	11	6			6	-4
	The management team leads by example, and follows the principles of quality.	9	-1	19	9	-21			-1	-11
	Managers provide training to their workers.	9	-16	4	14	4			4	-16
	Managers undergo frequent training.	-6	-6	-1	-1	-1			19	-1
1.b.	The orientation of all management activities is wholly consistent with the principles of total quality (client satisfaction, management based on facts rather than intuition, continuous improvement, involvement of all personnel, active leadership)									
	The management team assesses employee awareness with regard to total quality.	-2	-7	13	-17	13			13	-13
	The management team takes part in reviewing quality progress.	3	23	-7	3	-7			-7	-7
	The management team always appreciates the efforts made by individuals and teams.	17	7	-38	17	-18			2	12
	The management team acknowledges the achievements of individuals, teams, clients and suppliers.	18	-12	-32	19	-12			8	8
1.c.	The company's management provides active leadership towards total quality:									
	The management provides the necessary resources and support for improvement activities.	1	26	1	9	-39			21	-19
	The management takes initiatives to meet with clients in order to understand and satisfy their needs.	-6	34	-6	-1	-6			14	-26
	The management takes initiatives to meet with suppliers in order to understand and satisfy their needs.	1	1	1	16	1			1	-19
	Managers personally participate in activities designed to promote total quality outside the company.	12	-38	-8	12				32	-8

Figure 27: Identifying Information Gaps within the Enterprise

The individual answers with an absolute value greater then 30 percent marked as they indicated that a person had a largely different opinion from the average colleagues. In this case study, a senior manager, identified as person 2, believed that the management team does not demonstrate clear and open communication with its workers, as indicated by his response, seen in Figure 26. His opinion was not shared by the rest of the respondents who anonymously accepted that the management team demonstrates open communication with its employees, validated through an average performance score of 64%. The same process was employed for all the sections of the EFQM questionnaire. In this Company, a total of 56 instances were identified with a performance scope of more than 30 units lower or higher than the average score for a specific question. These cases were incorporated in the report that was handed back to the Company following the enterprise assessment stage.

The company employees agreed to complete the questionnaire eponymously, considering that the Knowledge Transfer Framework could be very beneficial, not only in terms of the assessment and improvement activities, but also in identifying individuals perceptions and asked their employees to complete the questionnaires and include their names. At a later conversation with the Company it was declared that the champion and the managing director gained a better understanding of individuals perceptions. A specific outcome was that the results demonstrated that the marketing manager was not happy with the customer service offered to the employees, while everyone else thought that they were performing adequately. The process had identified a problem that the Company was unaware existed. The author was not involved in solving the communication problem inside the enterprise, and no further research was conducted in this area.

The consensus values obtained through the calculation of individual responses were employed to calculate the average percentage score for each of the EFQM elements. The congregate average percentage score was employed to identify the strength or weakness of an individual company in a area of the EFQM model. Figure 28, demonstrates the congregate average for each element of the model, together with the overall average percentage score for the enterprise, labelled as "total score".

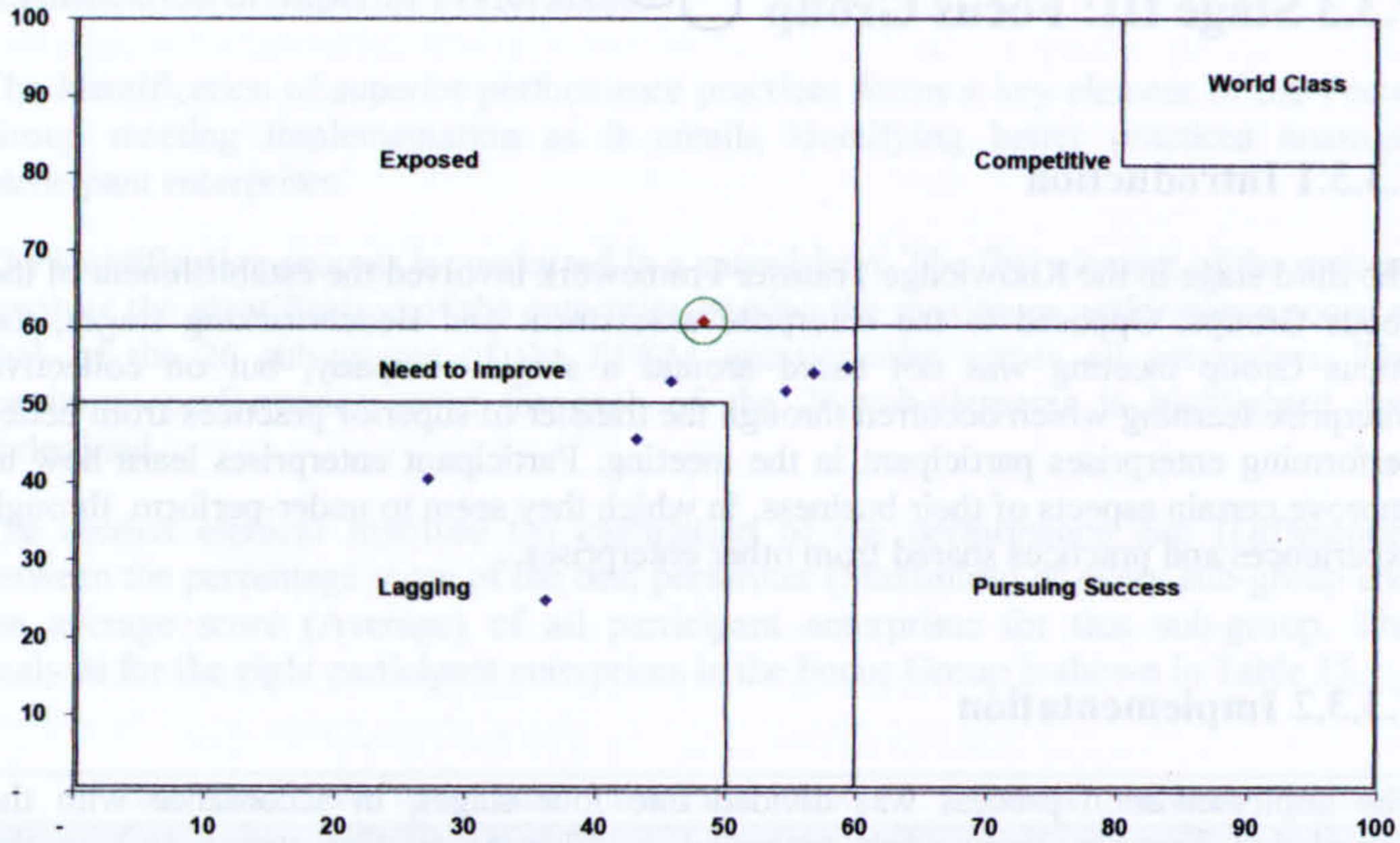


Figure 30: Enablers versus Results Cumulative Comparison

The graph identified the Company as the best performer in the Results criteria of the EFQM model, and demonstrated four Small and Medium-sized Enterprises which obtained better performance in the enablers criteria. Improving the enablers score could shift the Company towards the competitive area of the grid and hence improve its performance.

Data Analysis and Report Generation

The output of the Benchmarking process consisted of the preparation of a brief report for the enterprise based on the performance positioning stage of the Benchmarking process. The report handed out to the enterprise is attached in Appendix H, and was handed out to the process champion of the Company at the Focus Group meeting in confidence.

7.3.2.4 Conclusion

The enterprise assessment and Benchmarking stages of the Knowledge Transfer Framework were demonstrated through a case study from a small enterprise in Bedfordshire. The same process was implemented in all the participant enterprises.

7.3.3 Stage III: Focus Group

7.3.3.1 Introduction

The third stage in the Knowledge Transfer Framework involved the establishment of the Focus Groups. Opposed to the enterprise assessment and Benchmarking stages, the Focus Group meeting was not based around a single company, but on collective enterprise learning which occurred through the transfer of superior practices from better performing enterprises participant in the meeting. Participant enterprises learn how to improve certain aspects of their business, in which they seem to under-perform, through experiences and practices shared from other enterprises.

7.3.3.2 Implementation

The implementation process was divided into four stages, in accordance with the Knowledge Transfer Framework presented in Chapter 6. The stages include the preparation process, leading to the stages of identification of superior performing enterprises, the discussion on the accomplishment of superior performances through the establishment of a Focus Group meeting, concluding with the implementation of improvements within an enterprise.

Preparation Stage

The first part of the process involved preparing the invitations to the Focus Group event. The preferred size of the Focus Group meeting was established between 6 and 10 enterprises as discussed in Chapter 2. It was anticipated that the majority of the invited enterprises would participate in the event as their commitment in the process was gained from the first stage of the Knowledge Transfer process. Companies were also informed that during the event they would acquire the confidential Benchmarking report, and would obtain specific solution on how to possibly improve business performance furthermore. A copy of the enterprise invitation letter is attached in Appendix I.

Invitations for the Focus Group meeting were addressed to all the ten enterprises that took part in the enterprise assessment and Benchmarking processes. All enterprises replied, and eight were able to attend the Focus Group meeting, leading to an acceptance ratio of 73%. Two enterprises could not attend the event owing to other business engagements, and declared that they were keen to participate in any future Focus Group meetings. The establishment of the participants in the Focus Group meeting marks the end of the preparation stage, leading to the second stage in the process which involves identifying the superior performing enterprises.

Identification of Superior Performance

The identification of superior performance practices forms a key element of the Focus Group meeting implementation as it entails identifying better practices amongst participant enterprises.

The identification process is conducted in a spreadsheet. The first element of the process involves the identification of the enterprise bearing the maximum performance score at each of the 26 sub-groups of the EFQM questionnaire across all enterprises. The maximum performance score for each of the 26 sub-elements is highlighted and underlined.

The second element involves the calculation of the performance gap (Difference) between the percentage score of the best performer (Maximum) of every sub-group and the average score (Average) of all participant enterprises for that sub-group. The analysis for the eight participant enterprises in the Focus Group is shown in Table 15.

	Ukhit	Ukmit	Ukecs	Ukdag	Ukind	Ukrin	Ukhar	Ukjan	Average	Maximum	Difference
1a	38	35	43	**53**	**53**	42	20	48	42	53	(12)
1b	**61**	30	47	49	**61**	44	15	**61**	46	61	(15)
1c	48	45	41	62	**65**	50	20	53	48	65	(17)
2a	37	25	31	**61**	50	47	15	53	40	61	(21)
2b	38	20	31	56	48	40	**60**	52	43	60	(17)
2c	40	10	27	55	**57**	38	23	49	38	57	(20)
3a	18	25	30	41	45	29	10	**52**	31	52	(21)
3b	48	23	31	58	**61**	46	10	49	41	61	(21)
4a	70	57	33	61	59	55	**77**	56	58	77	(18)
4b	68	50	53	71	**74**	51	17	47	54	74	(20)
4c	54	10	43	54	**62**	48	30	48	44	62	(19)
4d	53	20	31	40	**56**	48	20	43	39	56	(17)
5a	44	70	83	64	**84**	38	50	76	64	84	(20)
5b	65	60	64	65	**72**	60	40	64	61	72	(11)
5c	70	70	**75**	73	**75**	62	50	70	68	75	(7)
5d	46	57	56	57	**61**	46	10	58	49	61	(12)
6a	48	30	35	63	**69**	34	10	54	43	69	(26)
6b	**77**	67	68	72	71	56	59	59	66	77	(11)
6c	65	57	65	**70**	65	59	23	54	57	70	(13)
7a	28	10	34	33	**53**	30	10	40	30	53	(23)
7b	47	10	41	42	49	44	36	**52**	40	52	(12)
7c	**88**	20	53	67	71	73	50	65	61	88	(27)
8a	15	10	28	32	**49**	48	40	25	31	49	(18)
8b	47	10	34	49	**63**	53	35	50	43	63	(20)
9a	**85**	28	52	52	40	59	45	58	52	85	(33)
9b	**75**	8	41	63	39	55	50	51	48	75	(27)

Table 15: Identifying the Best Performer Enterprises

All the enterprises achieved best practice in at least one sub-element of the EFQM model, with the exemption of Ukmit and Ukrin. The best performers amongst the participants are subsequently ranked in order of EFQM sub-element priority as described in Table 10. The results of the prioritisation are shown in Table 16.

Priority	EFQM Element	Best Practice Enterprises
1.	Customer Satisfaction	Ukhit, Ukind, Ukdag
2.	Business Results	Ukhit
3.	Processes	Ukind, Ukecs
4.	Leadership	Ukhit, Ukdag, Ukind, Ukjan
5.	People Satisfaction, Resources, People Management	Ukjan, Ukind, Ukhar, Ukhit
6.	Policy and Strategy	Ukdag, Ukind, Ukhar
7.	Impact on Society	Ukind

Table 16: Prioritisation of Best Practice Enterprises

As some enterprises were identified as best performers in more than one area of the EFQM model, it was felt appropriate to ask the enterprises to informally present two areas in which they exhibit superior performance. Table 17 presents the enterprises that were chosen for the Focus Group discussion on how better practices were accomplished.

Priority	EFQM Element	Best Practice Cases
1.	Customer Satisfaction	Ukhit, Ukind, Ukdag
2.	Business Results	Ukhit
3.	Processes	Ukecs
4.	Leadership	Ukhit
5.	People Satisfaction,	Ukjan
	Resources,	Ukind, Ukhar
	People Management	Ukjan
6.	Policy and Strategy	Ukdag, Ukhar
7.	Impact on Society	Ukind

Table 17: Selected Best Practice Enterprises

All the enterprises were provided with two best practice areas to present, leading to a total of twelve best practices case studies. The six enterprises were subsequently invited to conduct an informal presentation of about 5 to 10 minutes on their best practice during the group meeting, with emphasis on the achievement of best practice. An invitation letter concerning the informal presentation was sent to the champion in each

enterprise, together with the list of participants for the Focus Group meeting. The invitation letter is attached in Appendix I.

Two days before the Focus Group meeting, the administrator contacted the enterprises that have not responded to the invitation, to verify their intentions concerning the informal presentation. The process champion of the enterprise "Ukhar" did not feel comfortable to present at the meeting, but agreed to discuss with other enterprises about his company's better practices. Consequently, "Ukhar" was excluded from the list of presenting enterprises outlined in Table 17.

Accomplishment of Superior Performances

The Focus Group meeting was scheduled on the afternoon of Thursday the 16th of June 1998 at the Department of Enterprise Integration (formerly the CIM Institute), starting at 14:00. Prior to the meeting, business lunch was offered at the enterprises to provide an opportunity for enterprise champions and representatives to become familiar with each other.

A total of eight enterprises participated in the Focus Group meeting. The seating arrangement for the meeting was considered of high importance for the success of the event. The author felt that the participants from the enterprises should be seated in the foreground, facing the facilitator and each other at an angle. This would allow for direct eye contact between the enterprise representatives, and the facilitator.

The seating arrangement was conceived as to enhance the environment for discussion between the enterprises, while provide a sense of control of the event for the facilitator. Observers to the event were seated in the background, as demonstrated by Figure 31. A video camera was employed to record the meeting.

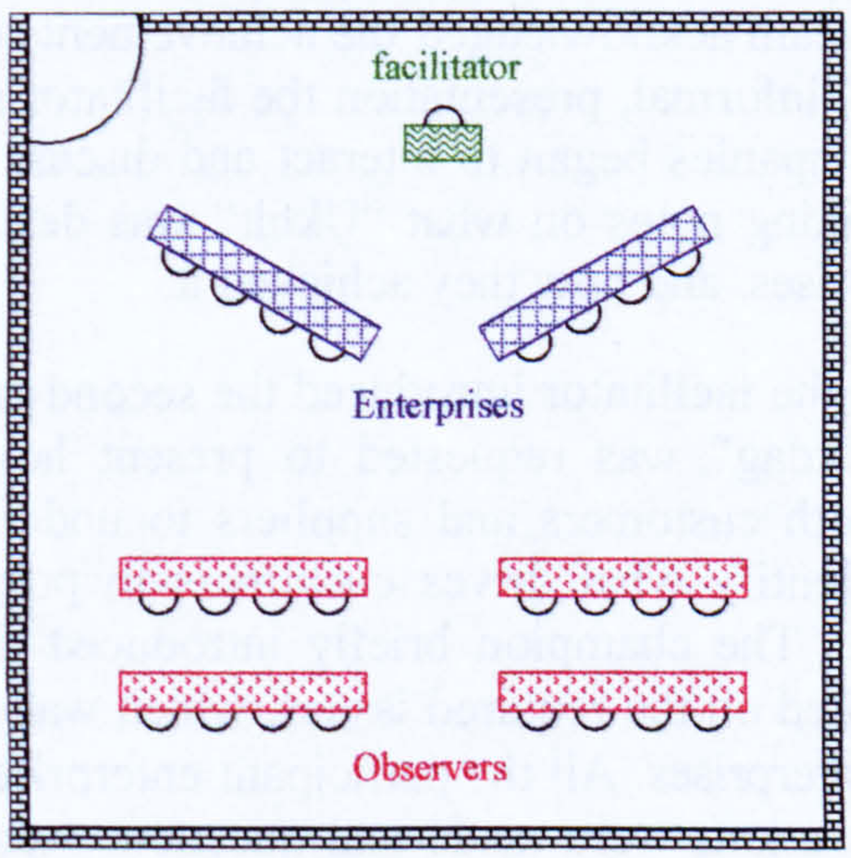


Figure 31: Focus Group Meeting Seating Arrangements

At the start of the meeting, the author, acting as the facilitator for the meeting, thanked the participants for their involvement and support for the Focus Group and emphasised that the purpose of the event was to learn from each others better practices. The Benchmarking report for each of the participant enterprise was handed out to the enterprise champion in a sealed envelope.

The theme for the afternoon was established as "Learning from Peers". The facilitator asked the participants to introduce themselves to the group, and briefly describe their principal business activities. This was considered essential as it was assumed that not all enterprises were introduced to each other during the informal business lunch.

The facilitator developed a presentation to control the progress and maintain a reasonable focus during the meeting. The first part of the presentation provided background information concerning the Knowledge Transfer Framework and how it is realised. The purpose was to describe to the participant companies the stages in the Knowledge Transfer Framework, to remind the enterprises of the link between the enterprise assessment and Benchmarking stages, with the implementation of the Focus Groups.

In the second part of the presentation, the enterprise selected in the previous stage of the Focus Group implementation process, were invited to discuss for about 5 to 10 minutes about the nature of their best practice, and how it was achieved. More specific guidelines on what areas to cover were provided to the enterprises in the invitation letter. Unfortunately, the representative of "Ukind" left the Focus Group prior shortly after the start of the meeting, owing to unforeseen business reasons, and could not present his enterprise superior performance during the Focus Group. He apologised to the author for the unplanned development and agreed to present at any future event.

The first enterprise to enter the conversation was "Ukhit". The champion was requested to discuss how the Company achieved high responsiveness to the customer demands and how the management team acknowledged the achievements of both individuals and teams. Following the brief, informal, presentation the facilitator asked an open question to start the discussion. Companies began to interact and discuss both issues, and some of the participants were taking notes on what "Ukhit" was describing as best practice amongst participant enterprises, and how they achieved it.

To progress the discussion the facilitator introduced the second enterprise "Ukdag". The process champion for "Ukdag" was requested to present how the enterprise takes initiatives to meet with both customers and suppliers to understand and satisfy their needs, and secondly to identify what drives customers to progressively place larger orders from the enterprise. The champion briefly introduced the enterprise and their product range, and elaborated on the required issues, which was followed by a series of questions from the other enterprises. All the participant enterprises were involved in the discussion actively. Observations were made and questions were asked leading to the identification of specific practices that lead to superior performance in "Ukdag", and the discussion lasted for about 25 minutes.

The third enterprise involved in the process was "Ukjan". The enterprise displayed superior performance in the areas of individual employee assessment and on the implementation and success of a profit-sharing scheme. The managing director acting as the process champion described how employee assessment was conducted at his enterprise, and how it related to the profit-sharing scheme. All the participant enterprises asked questions and were actively involved in the discussion process. The enterprise underwent a very difficult time in the past 3 years following the privatisation of British Rail which was their principal customer, resulting in a decrease of the workforce and turnover. The turnover was decreasing at a rate of 25% on a yearly basis. The main interest was on how the enterprise managed to increase the employee morale through the implementation of the profit-sharing scheme and the employee assessment process, considering the difficult financial situation. The discussion lasted for approximately 30 minutes and was continued over a short coffee break.

Following the short coffee break, which provided the opportunity for enterprises to further network their interests, "Ukecs" presented their superior performing practices. The areas of interest were how does the Company foster a close relationship with its customers and how they have defined standards for quality processes that are formally employed. The process champion for the enterprise described the above issues and answered questions that arose from the participant enterprises. The discussion concluded with issues relating to ISO9000 accreditation, which "Ukecs" has successfully acquired, and its affect on the enterprise processes and operations.

All the enterprises participated actively in the Focus Group meeting, and there was a bi-directional exchange of knowledge between participant enterprises on how superior practices were attained. Knowledge Transfer was done through the capture of notes, ideas or possible tasks on how superior performance was achieved in other enterprises. The majority of the enterprises both shared their superior practices and learned from other enterprises.

Implementation

No research was conducted on the implementation stage concerning improvement activities within the enterprises following the event, as mentioned in Section 6.3.3.2. The author presented to the participant enterprises the ease and effect graph on how to prioritise any changes within their enterprise, as mentioned in Chapter 6. Companies were also provided with the opportunity to ask any questions to the facilitator. The implementation stage formed the final part of the Focus Group establishment and the end of the Knowledge Transfer implementation process. The facilitator thanked participant enterprises for their full commitment to the process and noted that support on the implementation process could be obtained under the ADAPT – CORE project umbrella.

7.3.3.3 Enterprise Feedback

The enterprises that participated in the Focus Group meeting were asked to complete an evaluation form, which is attached in Appendix I.

Enterprises were requested to assess if they have acquired a good understanding of Benchmarking and its concept, if the presentation material was of high quality data, if the Knowledge Transfer process was objective, if the EFQM score was representative of the enterprises and quantify the potential for improvement through the Knowledge Transfer process. The results of the enterprise feedback are shown in Figure 32.

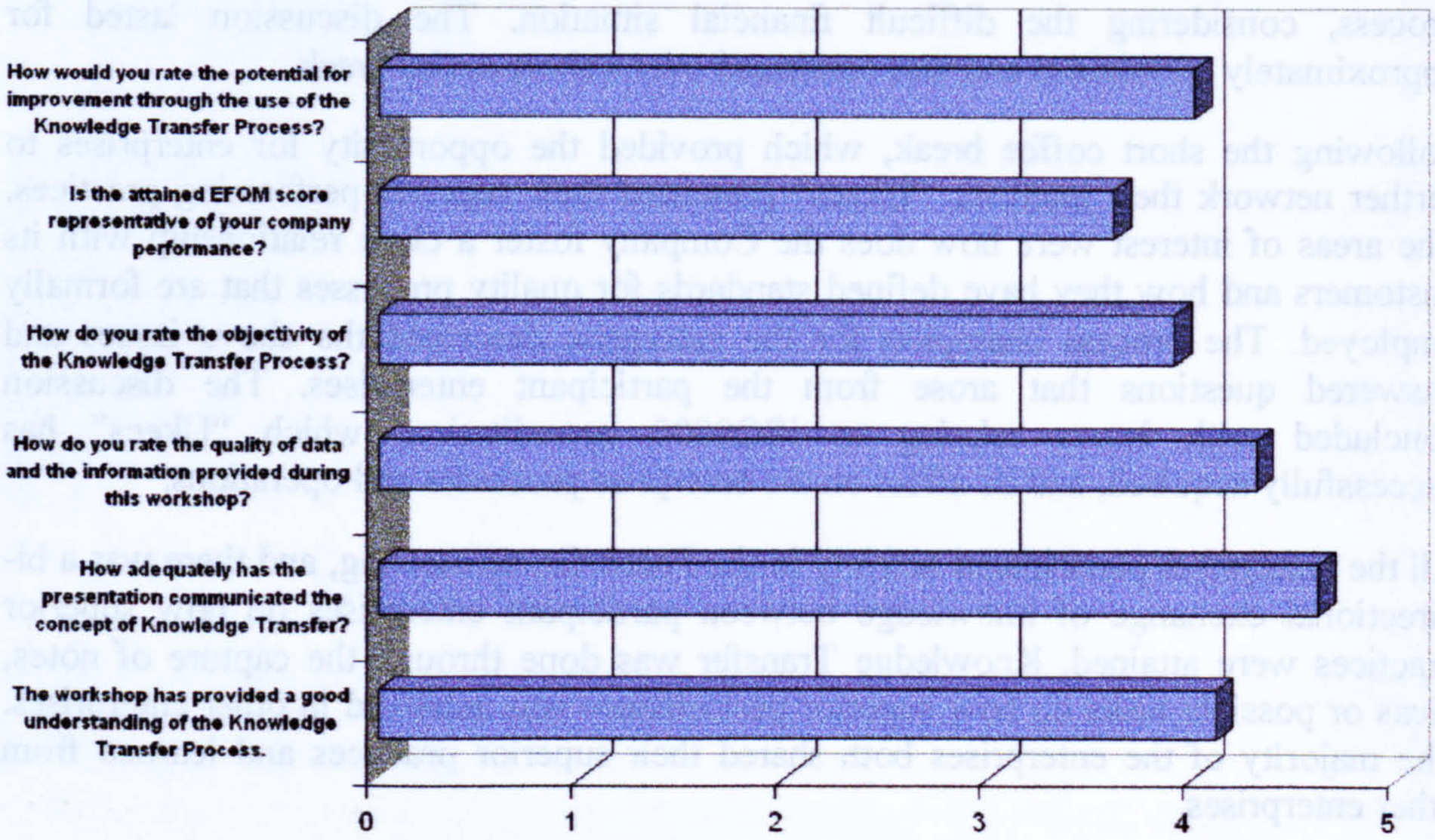


Figure 32: Enterprise Evaluation Results

Overall, participant enterprises considered the Knowledge Transfer Framework to provide a high potential for generating improvements in Small and Medium-sized Enterprises. Two of the participant enterprises thought that the EFQM percentage score did not fully match their current enterprise performance, as there was a 6-month lag between the enterprise assessment process and the implementation of the Focus Group. During that time some improvement activities have taken place following the enterprise assessment stage report which were not reflected in the Focus Group meeting, and hence affected the overall objectivity of the process. The enterprises were satisfied with the quality of the presentation and emphasised that the workshop provided a good understanding of the Knowledge Transfer process. Key lessons from the process are presented in Chapter 8.

7.3.3.4 Conclusion

The implementation of the Focus Groups suggests that successful bi-directional Knowledge Transfer can occur amongst Small and Medium-sized Enterprises. The research outcomes from the Focus Group meeting implementation are presented in Chapter 8. The observers in the Focus Group meeting included academics from Cranfield University and representatives from both the Bedfordshire Business Link and the Greater Nottingham Training and Enterprise Council. The Business Services Executive of the Greater Nottingham TEC expressed his interest in the process and requested under what conditions could the process be applied in the Greater Nottingham area to support local economic development.

7.4 Win-Win Benchmarking

Win-Win Benchmarking partnerships were established through the focus group meeting. A total of four enterprises (Ukhit, Ukdag, Ukjan, Ukecs) presented their superior performance practices to the participant enterprises, while Ukhar informally discussed some areas concerning their superior practices, while Ukind left the meeting owing to unforeseen business requirements. Two companies out of the eight did not present or discuss their practices with other enterprises (Ukmit and Ukrin).

Ukecs and Ukjan continued their co-operation following the Focus Group meeting. They were interested to capitalise on each other strengths in the areas of strategy development and ISO9000 accreditation process.

Figure 33 demonstrates the position of the enterprises on the "Enablers versus Results" graph.

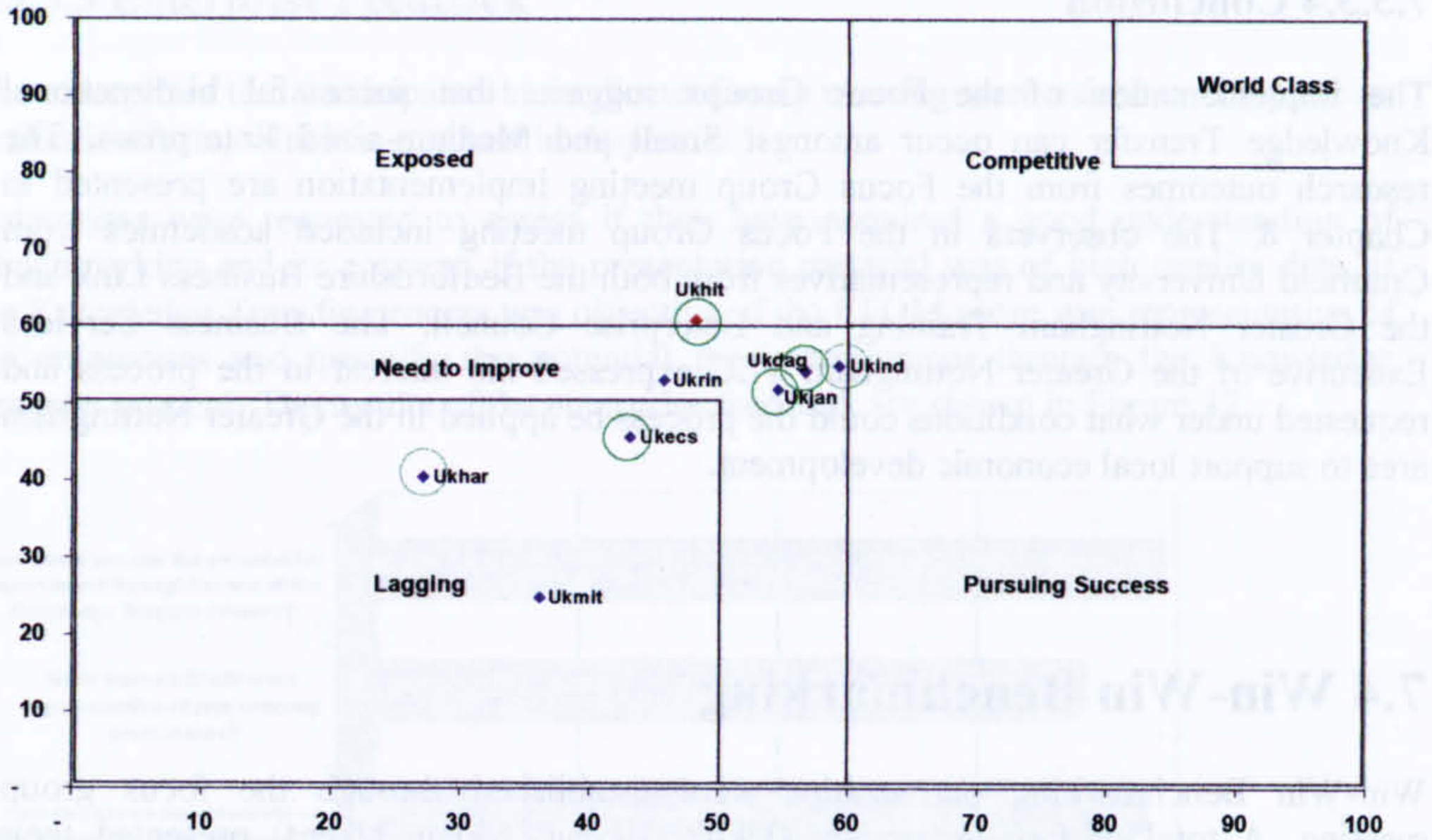


Figure 33: Win-Win Benchmarking

Enterprises presented their superior performance practices in different areas of their business. This provided the opportunity for participants to both disseminate their practices and learn from other enterprises, establishing "Win-Win Benchmarking" partnerships. All the enterprises were taking notes on how superior performances were achieved in other enterprises.

With the exception of Ukhar and Ukmit, the enterprises were at similar performance level, and therefore no large performance gaps were observed. Enterprises need not compare their performance against the best companies globally (for example, a World Class Enterprise), but against enterprises of similar overall performance displaying superior performance at a specific business area.

To support the implementation of Win-Win Benchmarking partnerships at a transnational level, the author has implemented an Internet based tool, described in the Appendix F, forming a research deliverable as outlines in Chapter 1.

7.5 Conclusive Remarks

The Knowledge Transfer Framework was implemented in three stages: the enterprise assessment, the Benchmarking process and the Focus Group implementation. The

enterprise assessment and Benchmarking stages were conducted in a portfolio of ten specially selected small sized manufacturing enterprises, eight of which were involved in the Focus Group meeting stage. The framework has been designed to comply with the needs of Small and Medium sized Manufacturing Enterprises; it is accessible, incremental, gives benefit at each stage, builds confidence alongside progress, and enhances the competitiveness of the micro level companies. Through the framework, Win-Win Benchmarking partnerships were successfully established, outlining that participant enterprises need not compare their performance against the global best practices to improve. An Internet based tool was developed to support the selection of appropriate partners, at a transnational level, for Win-Win Benchmarking, a deliverable of this work as outlined in Chapter 1.

The implementation process received credits from both the participant enterprises and economic development practitioners, and demonstrated that the Knowledge Transfer Framework can be successfully applied in Small and Medium-sized Enterprises, targeting the large majority of enterprises in the European Union.

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Chapter 8: Elaboration

8.1 Synopsis

This Chapter outlines the research objectives and the methodology followed and the research outcome. It discusses the research findings, experiences and observations following the implementation of the Knowledge Transfer Framework. The framework is compared against similar practices in the field, to position its application against other applications of similar nature. Key learning points are extracted, and limitations of the work are discussed. This Chapter provides an overview of the research, summarises the novelty of the work and discusses the areas for future work following this research.

8.2 Overview of Research

This section provides an overview of the research. It outlines the research area, describes the research objectives and the methodology followed and elaborates on the research deliverables.

8.2.1 Research Area

Small and Medium-sized Enterprises play a significant role in economic development at the micro and macro level. In Section 4.3, it was noted that Small and Medium-sized Enterprises constitute 99.8% of all companies, provide more than half of business turnover in the European Union, have a key role in job creation, and are the major contributors to supply chains. Ratcliff pronounces that the economy's strength is linked

to the small manufacturing company strength (Ratcliff 1997). However, Small and Medium-sized Enterprises seem to constantly underperform, and half of SMEs in the EU fail within the first five years of their creation. The typical weaknesses of SMEs are lack of time, financial and personnel resources, limited acquisition of new knowledge and usage of new technology, and concentration of activities into day-to-day management, as described in Section 4.3.

In Section 5.5 it was noted that knowledge forms the principal source of competitive advantage for any enterprise regardless of size. Knowledge is the business as much as the customer is the business. The collective ability to accumulate knowledge, and apply it to produce new knowledge, have underpinned development (Drucker 1993; Moralez-Gomez 1993). Strong businesses and economies draw on deep reservoirs of know-how and expertise. Competitive future lies in the Knowledge driven economy (DTI 1998).

However, Small and Medium-sized Enterprises experience a scarcity of new knowledge, and require a process to assist enterprise evolution, knowledge acquisition and management learning for the future, as discussed in Section 5.5. Smaller companies often fail to maintain coherence between continuous improvement and day-to-day management, due to Knowledge Deficit, which can imperil their sustainability and long term endurance in the business arena. Lack of knowledge can imperil progress. Assisting Small and Medium-sized Enterprises to enrich their Knowledge Base through decreasing the SME Knowledge Deficit, described in Section 5.5, could help them improve their performance.

The purpose of this research was to develop a framework that could be employed to transfer knowledge amongst Small and Medium-sized Enterprises in an effort to reduce the SME Knowledge Deficit. Knowledge Transfer is conducted in Information Technology through the development of Knowledge Based Expert Systems, as described in Section 5.6.2. Case studies extracted from the literature (see Sections 3.2 and 5.7) suggest that the transfer of other company experiences, identified through Benchmarking, can become a powerful catalyst for learning and improvement. However, the success of the Knowledge Importation case studies presented in sections 3.2 and 5.7 rely on an element of luck concerning the identification of superior performance and its source at different industrial sectors.

The application of Knowledge Transfer through Benchmarking in Small and Medium-sized Enterprises poses two issues. The first is that SMEs do not have the resources, the time, the knowledge required to implement Benchmarking initiatives, and experience difficulty in looking for partners and hence better practices in Benchmarking activities, as discussed in Section 4.4 and 4.4.1. The second problem is that Benchmarking initiatives for Small and Medium-sized Enterprises provide limited Knowledge Transfer amongst participant enterprises (see Section 4.5).

The aim of the research was to develop, implement and evaluate an advanced framework to enable Knowledge Transfer amongst Small and Medium-sized Enterprises. The framework uses knowledge-based potential within superior performing enterprises to enhance the competitiveness of under-performing companies, aiming to reduce the SME Knowledge Deficit, as described in Section 1.6.

The Knowledge Transfer Framework is based on Benchmarking and Self-Assessment principles, and is designed to comply with the nature of Small sized Manufacturing Enterprises. The nature of the research is practical and involves the fields of Benchmarking principles, Self-Assessment, Enterprise Assessment models, Knowledge Transfer and Small and Medium-sized Enterprises. The author applied and validated the framework in the fields of Small Manufacturing Enterprises that operate under the high Complexity and high Uncertainty typology, as described by Puttick (Puttick 1986), considering that enterprises operating under this typology are under higher jeopardy than enterprises under other typologies.

8.2.2 Research Conduct

The objectives of the research were identified as (see section 1.7):

- Review and Evaluate Benchmarking principles, self-assessment models and current Benchmarking practices
- Identify and understand the issues Small sized Enterprises face when they engage in a Benchmarking process
- Establish the requirements for the successful application of Knowledge Transfer
- Develop a Knowledge Transfer Framework to help these discrete Small sized companies to learn from better practices
- Evaluate the Knowledge Transfer implementation framework in selected companies to illustrate its valid application envelope.

The objectives divided the research into three key elements, shown in Figure 34.

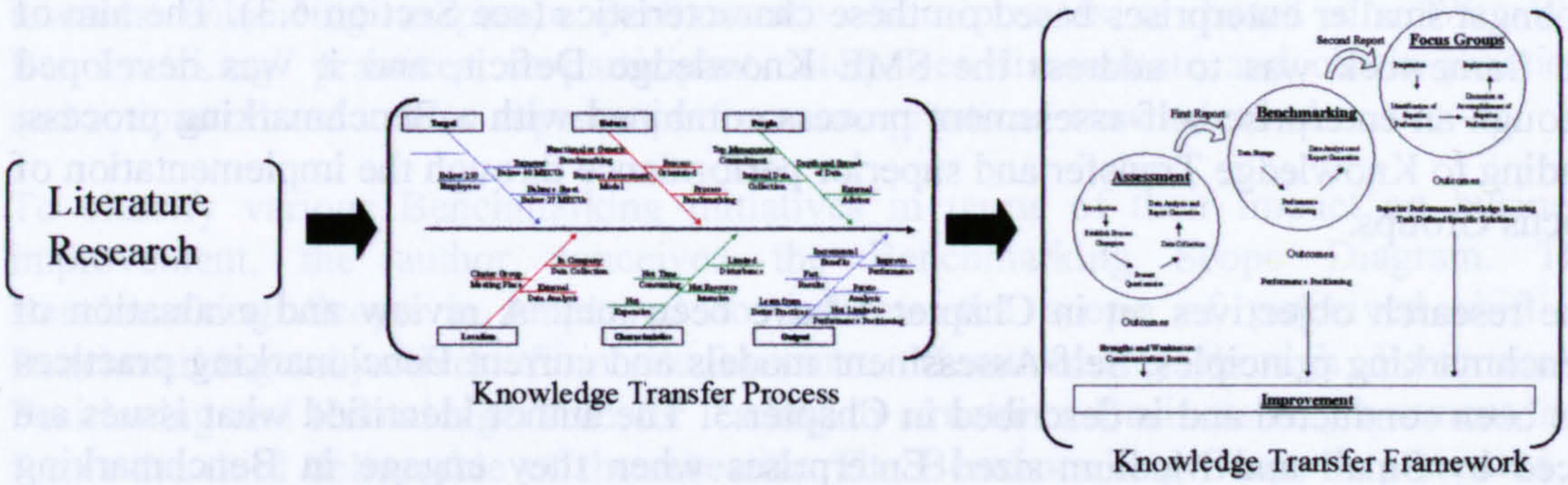

Figure 34: Three Elements of the Research

The first elements was the literature research and review concerning Self-Assessment, Benchmarking principles, Knowledge Transfer, the essence and the problems that Small and Medium-sized Enterprises face when they engage in Benchmarking Activities. The

The Knowledge Transfer Framework is based on Benchmarking and Self-Assessment principles, and is designed to comply with the nature of Small sized Manufacturing Enterprises. The nature of the research is practical and involves the fields of Benchmarking principles, Self-Assessment, Enterprise Assessment models, Knowledge Transfer and Small and Medium-sized Enterprises. The author applied and validated the framework in the fields of Small Manufacturing Enterprises that operate under the high Complexity and high Uncertainty typology, as described by Puttick (Puttick 1986), considering that enterprises operating under this typology are under higher jeopardy than enterprises under other typologies.

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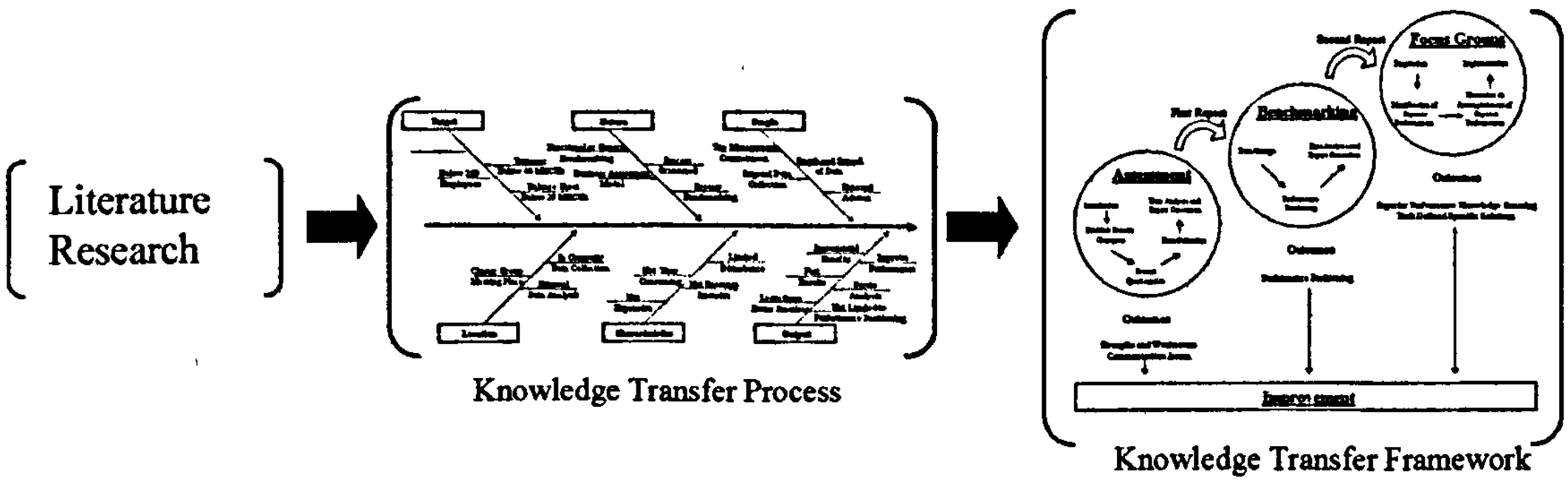

Figure 34: Three Elements of the Research

The first elements was the literature research and review concerning Self-Assessment, Benchmarking principles, Knowledge Transfer, the essence and the problems that Small and Medium-sized Enterprises face when they engage in Benchmarking Activities. The

author reviewed Benchmarking initiatives for SMEs in the United Kingdom to discover that they offered little scope for Knowledge Transfer between participant enterprises. The Research Conduct has utilised exploratory research to provide a thorough review and evaluation of Benchmarking principles, Self-Assessment and Benchmarking practices available to SMEs, while descriptive research was applied to identify and understand the issues that SMEs face when engaging in Benchmarking related activities, as described in Section 2.2.1.

The second element of the research involved the development of the requirements for the successful application of Knowledge Transfer, shown in Section 5.8.7. The development of the requirements or characteristics of the Knowledge Transfer Process were based on the application of grounded theory, which is described in Section 2.2.5.

The third element of the research involved the realisation and implementation of the Knowledge Transfer Framework. The framework was based on the prerequisites for Knowledge Transfer, which were identified in the previous element of the research, and thus involved the use of grounded theory. The implementation of the Knowledge Transfer Framework involved the application of Focus Groups, as described in Sections 2.2.1. The principles of exploratory, explanatory, descriptive and grounded theory are provided in Chapter 2, along with background information concerning the implementation of Focus Groups.

Qualitative and quantitative data was acquired throughout the research methodology, concerning the development, realisation, implementation and validation of the framework, as described in Chapter 2.

8.2.3 Research Output

The author has defined the characteristics of a successful Knowledge Transfer Process for SMEs (see Section 5.8.7), and developed a framework for Knowledge Transfer amongst smaller enterprises based on these characteristics (see Section 6.3). The aim of the framework was to address the SME Knowledge Deficit, and it was developed through an enterprise self-assessment process combined with a Benchmarking process, leading to Knowledge Transfer and superior performance through the implementation of Focus Groups.

The research objectives set in Chapter 1 have been met. A review and evaluation of Benchmarking principles, Self-Assessment models and current Benchmarking practices has been conducted and is described in Chapter 3. The author identified what issues are faced by Small and Medium-sized Enterprises when they engage in Benchmarking practices, demonstrated in Chapter 4. The identification of the issues led to the development of the characteristics for a successful application of a Knowledge Transfer methodology based on Benchmarking, Self-Assessment, and Focus Group practices. This is described in Chapter 5. The Knowledge Transfer Framework was developed based on the predefined characteristics, to provide the baseline for Knowledge Transfer in Small and Medium-sized Enterprises, and is described in Chapter 6. The framework

implementation is described in Chapter 7, and discussions concerning the research are outlined in this Chapter.

The deliverables from the research are listed in Section 1.7 and consist of:

- A requirements map for successful Knowledge Transfer in SMEs
- A validated Framework to help small companies transfer knowledge from Better Practices
- A mapping mechanism for comparison of Benchmarking initiatives
- Identification process for Win-Win Benchmarking partner selection.

The requirements map for successful Knowledge Transfer in SMEs is provided in Section 5.8.7, as the prerequisites for the establishment of Knowledge Transfer in Small and Medium-sized Enterprises. The prerequisites were employed to develop the SME Knowledge Transfer Framework, which was validated in 10 Small and Medium-sized Enterprises. The framework forms the second deliverable of this research and is described in detail in Chapter 6. It consists of three stages, the Enterprise-Assessment stage, the Benchmarking Stage and the Focus Group implementation stage.

The Knowledge Transfer process is divided into three stages, the first stage involves the assessment of the enterprise activities and outputs, and forms the Performance Measurement system. The process is conducted through the use of a self-assessment questionnaire based on the European Foundation for Quality Management Business Excellence Model, and is based on qualitative and quantitative data collected both horizontally and vertically in the enterprise. The outputs of this stage are the identification of enterprise strengths and weaknesses and the verification of possible intra-enterprise communication problems. The second stage employs Benchmarking practices to position the performance of the enterprise against other similar sized organisations. In the third stage, bi-directional exchange of knowledge between participant enterprises is achieved, leading to the provision of task defined solutions towards enhancing corporate performance. The process is based on "Win-Win Benchmarking" practices, as participant enterprises disseminate and obtain practices and actions related to how superior performance practices were achieved.

To classify various Benchmarking initiatives in terms of their impact on business improvement, the author conceived the Benchmarking Scope Diagram. The Benchmarking Scope is employed to indicate the scope of perceived shift in Benchmarking objectives from Performance Measurement, through Performance Positioning and Knowledge Transfer leading to structured Business Improvement, and forms the third deliverable of the research. The Benchmarking Scope is presented in Section 6.4.

Finally, through the Knowledge Transfer Framework, the author successfully established Win-Win Benchmarking partnerships amongst participant enterprises, as defined in Section 3.2.6. The establishment of "Win-Win Benchmarking" through the Knowledge Transfer Framework is described in Section 7.4, while the application of

"Win-Win Benchmarking" through the World Wide Web is demonstrated through the development of an Internet Based Tool, shown in Appendix F.

8.3 Research Observations

The Knowledge Transfer Framework, described in Section 6.3 consists of three main elements: the Enterprise Assessment, the Benchmarking and the Focus Group Stages. The observations concerning each stage of the implementation of the Knowledge Transfer Framework are described in the following sections.

8.3.1 Stage I: Enterprise Assessment

The first stage of the process incorporates the enterprise assessment stage, which is described in Section 6.3.1. It is subdivided into five principal activities and forms the Performance Measurement System (PMS) for the Knowledge Transfer Framework.

The purpose of this stage is to collect data from the company and provide an assessment of its business processes, and it is divided into five stages: the introduction process, the process champion identification, the questionnaire presentation, the data collection process and finally the data analysis and report generation. Each of the stages are analysed in the following sections.

The introduction process involves an introductory meeting between the process administrator and the managing director of the enterprise. Some of the participant enterprises involved other members of the managing team. The main elements of the introductory meeting as described in Section 6.3.1.3 were to present the Knowledge Transfer Framework, its requirements of the enterprise, the benefits and its purpose.

This stage was very important to ensure top management commitment for the process and to make sure that the enterprise had the right culture for the process, as described in sections 7.2 and 5.8.4 respectively.

The next stage in the process involves the selection of the process champion inside the company, described in Section 6.3.1.3. The process champion forms the principal representative and contact for the enterprise. The author expressed a preference that the selected champion should have a managerial status within the company, and a reasonable experience on quality and management issues. Five of the participant enterprises nominated their Managing Director to become the process champion, three enterprises selected their business development/personnel manager and the remaining two enterprises selected their quality manager. Following the meeting, the author asked the process champion some questions concerning the activities of the enterprise and the background history. This was very useful as it provided the author with a perspective of the enterprise activities, and indicated initial areas of strengths and weaknesses. This

was used to cross check the results from the Enterprise Assessment Stage. The questions that the author asked are listed in the Appendix E.

The next stage was to present the Enterprise Assessment Stage to the process champion. This was important as the process champion should become familiar and understand the questions and their purpose, as he would become the person employees would reach if the had any problems. This stage usually lasted between one and two hours as the administrator went through all the questions to ensure that the process champion had a good understanding of the process. The author found that some managers (Ukdag, Ukecs, Ukdut) that had undergone recent training in management related issues were able to go through this stage at a faster pace than other managers. This is in agreement with Nelder, who notes that managers with training and experience are much more open to new ideas and are more confident that they can use them to improve their business performance (Nelder 1988).

The next stage forms the data collection process within the enterprise, as discussed in Section 5.8.5. The questionnaire is distributed in the company through the process champion, who must briefly discuss the objectives of the process with the employees and encourage their participation. The preferable way of distributing the questionnaire is during a meeting, which will be attended by both managerial and non-managerial employees.

All questionnaires responses were requested to be anonymous. However, one of the enterprises believed that the Knowledge Transfer Framework could be very beneficial, not only in terms of the assessment and improvement activities, but also in identifying individuals perceptions and asked their employees to complete the questionnaires and include their names. The culture of the enterprise was very open and the organisation had a flat organisational structure. The managing director considered all the employees in the organisations as stakeholders in the enterprise, and all the employees had equal status.

In terms of employee participation, one of the participant enterprises had a 100% employee representation in the data collection process. The average number of returned questionnaires per enterprise were 8 and the average number of employees was 27, leading to an average representation of the workforce equal to 30%. As described in Section 6.3.1.3, data was sourced across the organisation to overcome the problem of objectivity in enterprise assessment over a single company dataset. The horizontal data collection will provide a spread of opinions of people sharing similar responsibilities and roles within the enterprise, while the vertical spread will identify gaps between the perceptions of various employees at different organisational levels.

Upon return of the questionnaires the author conducted the analysis of the results. The analysis stage had two objectives: to provide the company with a profile of its strengths and weaknesses and to display any communication problems within the enterprise. The author presented the results back to the enterprise, in a meeting with the process champions at each participant enterprise. All the enterprises discussed the results and provided some feedback to the author concerning the data collection process.

Two of the enterprises reported that some of their employees found it difficult to complete some sections of the questionnaire. This lead the author to change some of the questions to make them easier understood to shopfloor employees. Feedback obtained during the presentation of the results at this stage indicated that enterprises felt that it was advantageous to source data from every level and function across the organisational structure. Three companies noted it was the first time the majority of their employees were involved in a data collection process originating outside the enterprise, and they considered the data collected as employee feedback. All the participant enterprises favoured the idea of collecting data both horizontally and vertically within their organisational structure.

The Enterprise Assessment stage provided a description of the strengths and weaknesses of each participant enterprise based on the EFQM Model. This was employed to address the first element of the SME Knowledge Deficit, described in Section 5.5.

The next level in the process involved the Benchmarking process

8.3.2 Stage II: Benchmarking Process

The Benchmarking process stage of the Knowledge Transfer Framework positions the performance of a Small and Medium-sized Enterprise against other companies. The administrator conducts the process and the results are provided to the company in the form of a confidential report during the Focus Group meeting.

The Benchmarking stage has three elements as described in Section 6.3.2.2. The first stage is the storage of the data in the database system, followed by the development of the performance positioning table, and the report generation.

The Enterprise Assessment stage identified the strengths and weaknesses of participant enterprises. The performance comparison stage allowed enterprises to check and map their performance against other enterprises, and realise that there are other enterprises, similar in size, facing similar problems to them, which perform better in some areas of their business. The managing director of a manufacturer of precision systems noted that the comparison against similar enterprises, which performed better at some areas of their business, was an excellent drive for improvements. She quoted: "*if they can do it, we can do it*!". This stage provided an awareness of performance standards in other enterprises, aiming to address the second element of the SME Knowledge Deficit, described in Section 5.5.

The next stage in the process involved the Focus Group implementation.

8.3.3 Stage II: Focus Group Implementation

The aim of the Focus Group implementation was to provide enterprises with practices and actions which when implemented could lead to superior performance, aiming to address the third element of the SME Knowledge Deficit, described in Section 5.5

In the first stage of the Knowledge Transfer Framework, data was collected within the enterprise to assess its performance and through the second stage, the company performance was compared to other Small and Medium-sized Enterprises. The third step involves sourcing practices and actions concerning how superior practices were achieved in leading organisations and is of high significance as it transfers knowledge from the better performers to the under-performers. The Focus Group process consists of four stages, which include: the preparation of the event, the identification of superior performances, the discussion on accomplishment of superior performances, and finally the implementation of improvements within the enterprises.

The requirement for the Focus Group establishment was to obtain between 6 and 10 participant Small and Medium-sized Enterprises, as discoursed in Section 6.3.3.1. The author conducted the initial preparation for the event, which involved inviting enterprises to join the meeting. The next stage was the selection of the superior performances across the enterprises that agreed to participate in the event. The author decided that it would be better to base the Focus Group Meeting implementation around better practices employed by other companies which were present in the meeting. This would provide the opportunity for enterprises to exchange ideas and opinions about how superior performance can be achieved. The author carefully selected the enterprises which were requested to present their superior practice using a selection process which is described in Section 6.3.3.2.

The Focus Group meeting occurred at the third element of the process, which involved sourcing practices from better performing enterprises. Companies presented their superior performances, outlined how they were implemented, and described the issues and problems they faced in the implementation process. The other enterprises asked questions and all participants engaged in a discussion exchanging experiences and expertise. The discussion was open and enterprises felt conformable discussing and disseminating their superior practices. Enterprises were taking notes concerning ideas, activities and practices which were implemented by the superior performers, with the aim to try to realise them internally in their organisation.

Ideally, the author would follow the implementation of the improvement practices and activities inside each of the participant enterprises. However, the author decided not follow the implementation of any activities or practices sourced from the Focus Group meeting inside the enterprises, and the principal reasons for his decision were:

- The investigation of the implementation activities inside the enterprises was not the focus of the research
- As most of the enterprises were employing only financial indicators, the author consider it would be difficult to associate any improvements in profits or turnover

directly to the activities implemented following the Knowledge Transfer Framework.

The Knowledge Transfer Framework has sourced knowledge from the better performers and transferred it to the under-performers in the form of specific actions, tasks or practices that could be employed to enhance business performance. The framework does not focus on the intra-enterprise interpretation and implementation process, which will lead the transferred knowledge of the better performer enterprise to become organisational knowledge of the under-performing enterprise.

However, as a feedback to the Knowledge Transfer Framework, the author contacted the participant enterprises to identify if they had done any improvements following the Focus Group Meeting. The answers the author obtained were very encouraging. Three enterprises reported that they have implemented several practices sourced from the Focus Group meeting, and were satisfied with the results. Ukhit have implemented changes in the marketing activities following the superior practices noted from Ukecs, and changed their employee assessment processes in line with superior performance practices sourced from Ukjan. Ukdag have changed their employee assessment and reward process following the Ukjan experiences. Ukecs and Ukjan continued their co-operation following the Focus Group meeting. They were interested to capitalise on each others strengths in the areas of strategy development and ISO9000 accreditation process. Ukecs returned to Cranfield University to request further assistance on strategy formulation, as a direct outcome of the Knowledge Transfer Framework. Ukhar mentioned that they would contact Ukdut for further information on Computer Based Filling Systems.

Moreover, as direct consequence of the Knowledge Transfer Framework, Ukjan became a best practice demonstrator enterprise for the Central Logistics Association for Supply-Chain Partnerships (CLASP), and hosted a CLASP event on employee motivation.

The best results from Knowledge Transfer initiative can come from organisations that building a cohesive and continuous change process. The author encouraged participant enterprises to repeat the performance assessment after a period of one year to assess developments and encourage continuous improvement. The companies agreed to repeat the process in one year's time to identify improvements.

8.4 Critical Factor Compliance

Zairi notes the criteria for the establishment of successful Best Practice sharing, and subsequently Knowledge Transfer (Zairi, 1998), sourced from ACA News, September 1995. The Critical Factors of Success have been listed primarily for Best Practice Sharing within enterprises, but can be employed to assess cross-boundary Knowledge Transfer.

The Knowledge Transfer Framework has been developed in accordance with these factors, as shown in Table 18. The left column of the table lists the Knowledge Transfer Critical Success Factors and the right hand side column provides evidence of compliance against each factor.

Knowledge Transfer Critical Success Factors (Zairi 1998)	Evidence of Compliance
Trust	The process administrator provides confidentiality for enterprises. Enterprises are non-competitors which allows for more flexibility in the share of superior practices
The ability to communicate clearly and with enough bandwidth to transfer meaning	The experienced facilitator in the Focus Group meetings will ensure that no communication barriers (such as strong personalities or mindsets) will endanger the Knowledge Transfer Process
A common context or language	The use of a the EFQM model amongst all the enterprises ensures a common context
A reason or goal for sharing	All enterprises participate in the process to learn practices that can lead to superior performance from other participant enterprises. The aim is to improve current performance
The space to think and reflect	The Focus Group discussions provide enterprises with the space to think, reflect and discuss with other enterprises. There are no barriers in the questions that can be asked, and enterprises have ownership of the event
The ability to interact with others in a non-purposeful way	Companies that participate in the Focus Group meeting interact with other enterprises to learn. Interactions are open and do not involve any hidden agenda or purpose
The autonomy to share	Enterprises are presented with the opportunity to share their expertise, and may decide not to present their strengths to other participant companies.
Local knowledge that can be transferred easily	The process administrator invites enterprises to present knowledge that is not product specific, but process related, and would be therefore of interest to other enterprises. The Focus Group meeting concentrates on how the superior performance was achieved rather than solely the identification of better practices. Consequently Knowledge is Transferred in the form of practices or actions that could be followed to achieve superior performance
A control and command structure that supports knowledge sharing	The process administrator and the Focus Group facilitator provides a strong control structure for the process. Moreover, top management commitment ensures that a strong control is obtained within the enterprise.
The infrastructure to support learning	The Knowledge Transfer Framework has been designed to support learning and tackle the SME Knowledge Deficit

Table 18: Evidence of Compliance

Wathne et. al (1996) suggest some key factors influencing the effectiveness of the knowledge exchange. In particular, they propose three main features, which are *openness, trust and prior experience* (Wathne et. al 1996). In the Knowledge Transfer Framework, it is a requirement that enterprises must be willing to disseminate their superior practice and must be receptive to new knowledge. This forms part of the

authors Criterion 5, in Section 7.2, involving the selection of Small and medium-sized Enterprises to participate in the Knowledge Transfer Framework.

The element of trust, which is noted by Zairi is also considered essential in the Knowledge Transfer Framework. The process administrator provides confidentiality for participant enterprises. Moreover, the Knowledge Transfer Framework is based on a combination process and cross sector Benchmarking (see Section 5.8.2). Participant enterprises are non-competitors, which allows for more flexibility in the share of superior practices. If participant enterprises were direct competitors then no information would be released without their prior written consent. The author considers trust to be very important in establishing an inter-company collaboration, as it can influence the openness of participants.

Finally, the element of prior experience is related to the ability of acquiring, using and transferring new knowledge. Cohen and Levinthal note that prior knowledge increases both the ability to store new knowledge and the ability to recall and use it (Cohen and Levinthal 1990). Wathne et. al. claims that the higher the degree of prior experience, the greater the effectiveness of Knowledge Transfer (Wathne et. al. 1996). The enterprises that participated in the Knowledge Transfer Framework were of similar overall performance, as described in section 7.4 and operated under similar conditions (see Section 4.4.1). Consequently, there were no large differences between the enterprises at a high level. However, during the Focus Group meeting, enterprises were provided with the opportunity to discuss with the superior performers and ask questions to clarify any issues.

The Knowledge Transfer Framework is closely linked to Total Quality Management, as its purpose is to improve enterprise performance, and is based on Self-Assessment and Benchmarking practices which form integral part of Total Quality management as described in Chapter 3. This is supported by Thiagarajan and Zairi who note that Benchmarking and Self-Assessment form an integral part of Total Quality process (Thiagarajan and Zairi 1997b).

Thiagarajan and Zairi have conducted a thorough review of the literature for critical factors for Total Quality Management. The identified factors are considered conductive for the success of TQM related implementations and were based on case study experiences, and supported by quality gurus and writers (Thiagarajan and Zairi 1997a, Thiagarajan and Zairi 1997b, Thiagarajan and Zairi 1997c). They stress the importance of ensuring top management commitment and actively involving the management team in a TQM initiative (Thiagarajan and Zairi 1997a). This is recognised by the Knowledge Transfer process characteristics. In Section 5.8.4 the author emphasised the importance of top management commitment, and in the involvement of the management in the Knowledge Transfer process is encouraged as described in Section 6.3.1.3.

Moreover, they note that Total Quality Management practices succeed only if employees are actively involved in the process and if middle management does not perceive the TQM implementation as a threat to their authority and life-style (Thiagarajan and Zairi 1997a). The Knowledge Transfer Framework involves employee participation, as data is collected from both horizontally and vertically within the

enterprise, as discussed in Section 5.8.4. The issue of middle management is considered less important in small enterprises in comparison to large enterprises, as companies with below 50 employees may not have many levels in their organisational structure and have limited functionaries as described in Section 4.4.

Thiagarajan and Zairi also stress the importance of training and education and reward and recognition for the success of TQM initiatives (Thiagarajan and Zairi 1997a). The author recognised the importance of training in the success of the Knowledge Transfer Framework, an provides informal training for the process administrator in the enterprise to ensure that awareness of the data collection process and a good understanding of the Enterprise Assessment questionnaire. However, training was not provided to all the company employees in the participant enterprises, in the view that they would contact the process champion should any problem arises. Reward and recognition for employees are considered very important by the author, as they can form a powerful drive for participation and success. However, the are related to the implementation of the improvement activities and importation of knowledge inside the participant enterprises, and are beyond the principal focus of this research work.

Finally, they emphasise the importance of communication, by noting that effective communication could cake the difference between success and failure (Thiagarajan and Zairi 1997b). Under the Knowledge Transfer Framework, the champion is responsible for the communication inside the enterprises, as they present the purpose and the enterprise assessment questionnaire to the enterprise employees, see section 6.3.1.3, and subsequently present the results back to the employees as described in section 6.3.3.2. Moreover, the participation of employees in the Knowledge Transfer Framework was well received by enterprise employees as described in Section 8.3.1

8.5 Comparative Analysis

In this section, the Knowledge Transfer Framework will be compared against other models of Knowledge Transfer. Differences and similarities are outlined.

8.5.1 Gilbert and Cordey-Hayes Model

Gilbert and Cordey-Hayes propose a model for Knowledge Transfer (see Gilbert and Cordey-Hayes 1996). The model is used as a framework for exploring the organisational processes and investigates internal knowledge transfer within organisations. The Gilbert and Cordey-Hayes model is divided into five stages: Acquisition, Communication, Application, Acceptance and Assimilation.

The first step in the model involves knowledge *acquisition*. As the model has been developed for internal Knowledge Transfer, Knowledge sourcing is conducted inside the Enterprise. The second stage involves the *communication* of knowledge once it has

been acquired. The model requires that the communication mechanisms are developed so that the opportunities for transferring knowledge are present and encouraged. The next involves knowledge *application*, as knowledge must be applied to be retained, and is followed by knowledge *acceptance*. Once knowledge has been applied, before it can be assimilated into the core routines of the enterprise, it must be found acceptable by the individuals, hence the acceptance stage. The final stage in the framework is assimilation, which represents the process of cumulative learning involving changes in individual abilities and organisation routines as a direct result of the use of the acquired knowledge.

The Gilbert and Cordey-Hayes Model has been developed as a framework of intra-organisational learning and has been applied in Lloyds Private Banking. The organisations that will employ the model need to be actively seeking to improve and acknowledge that learning and continuous improvement are essential processes for change. The Knowledge Transfer Framework differs from the Gilbert and Cordey-Hayes Model in the notion that the latter is developed for intra-organisational learning. The author believes that the two models are supplementary to each other. The Knowledge Transfer Framework could identify and source knowledge outside an organisation and the Gilbert-and Cordey-Hayes Model could be applied to ensure that the knowledge sourced becomes embedded in the organisational processes.

8.5.2 Albino, Garavelli and Schiuma Model

Albino et. al. extend the Gilbert and Cordey-Hayes Model to establish an inter-enterprise Knowledge Transfer process (see Albino et. al. 1999). According to the Albino, Garavelli and Schiuma Model, Knowledge Transfer can be conceptualised as a combination of two components: the "information system" and the "interpretative system" as shown in Figure 35.

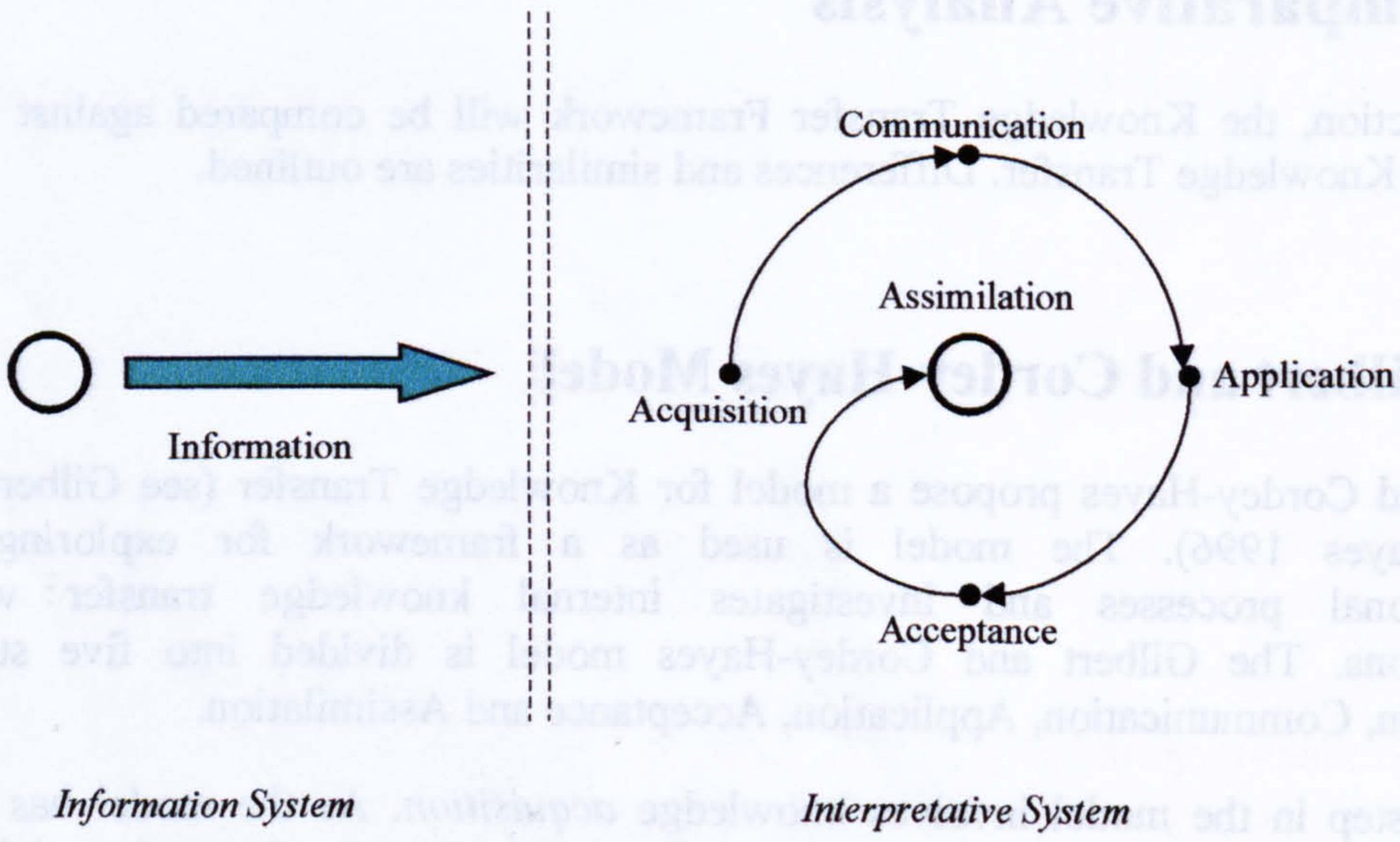

Figure 35: The Albino, Garavelli and Schiuma Model

The information system provides the information (or knowledge) from the external organisation. Albino et. al. argue that the information (or knowledge) cannot be yet considered as part of the receivers organisational knowledge, as it must be submitted to an interpretation process within the organisation itself to become organisational knowledge (Albino et. al. 1999). This is true considering that for knowledge that is transferred across organisations, it must be applied to become organisational knowledge.

The focus of this research is not the transformation of knowledge into organisational knowledge, but the inter-firm knowledge transfer. Subsequently, the Knowledge Transfer Framework could substitute the information system of the Albino, Garavelli and Schiuma Model, as shown in Figure 36.

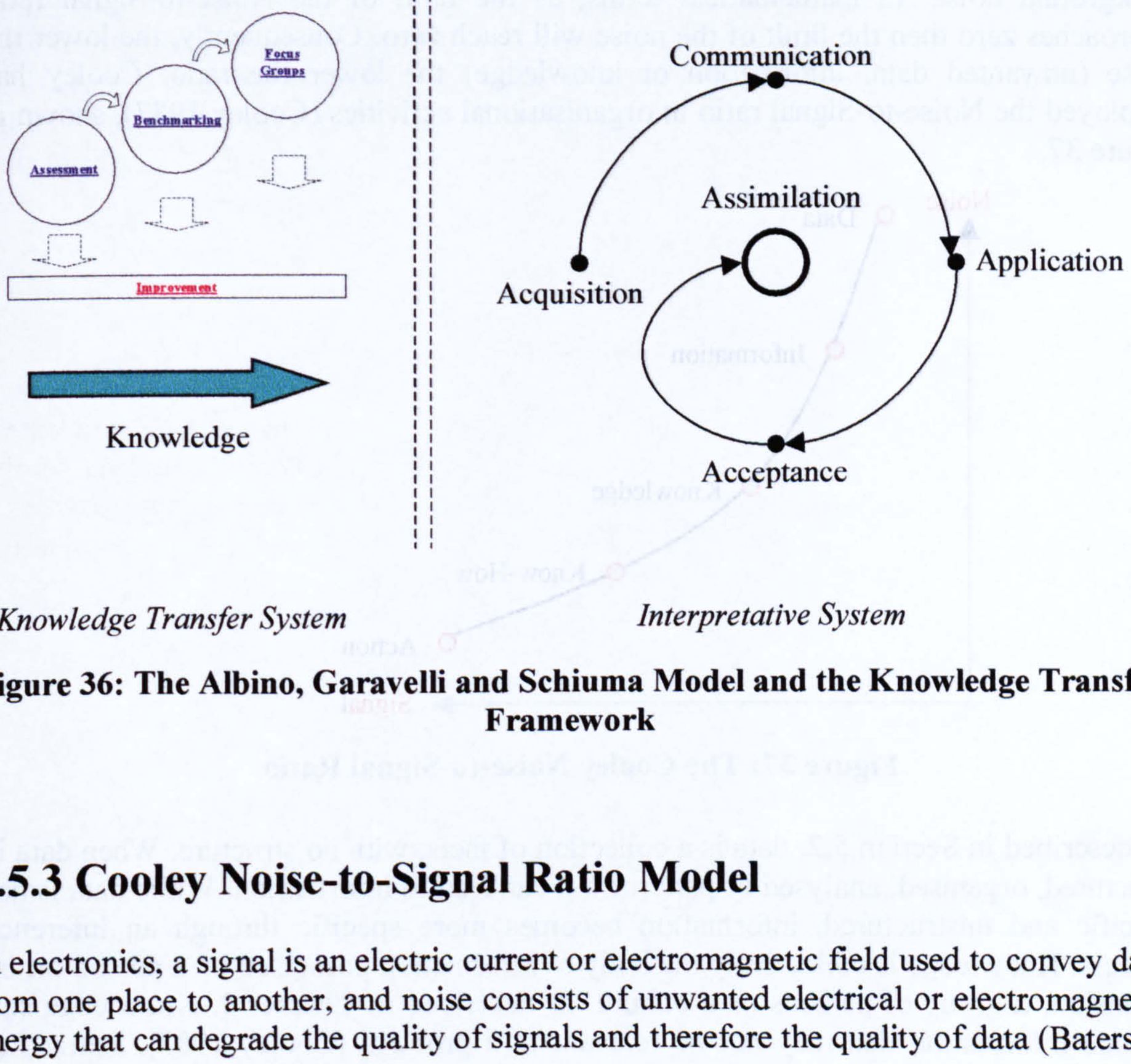

Figure 36: The Albino, Garavelli and Schiuma Model and the Knowledge Transfer Framework

8.5.3 Cooley Noise-to-Signal Ratio Model

In electronics, a signal is an electric current or electromagnetic field used to convey data from one place to another, and noise consists of unwanted electrical or electromagnetic energy that can degrade the quality of signals and therefore the quality of data (Baterson 1998).

The relation between noise and signal can be extended to Knowledge Transfer. Enterprises that engage in external scanning for superior practices must be aware of their strengths and weaknesses and adopt and adapt a superior practice to improve their business performance, to avoid comparing "apples versus pears" and "cloning" as

described in Section 3.2.5. Companies that are unaware of their strengths or weaknesses may identify superior practices that may not be applicable in their enterprise. As Cooley notes, assimilation of Knowledge leads to a "fine-tuned scanning" (Cooley 1987).

Spendolini notes that external comparisons require substantial planning, process instruction, quality, time, staff support and funding (Spendolini 1994). This is supported by Camp and Watson who note that a clear understanding of the company's current practices and business processes is essential, as it forms the basis for external comparison (Camp 1989; Watson 1993). Trott notes that external scanning for superior practices without a full understanding of an organisations capabilities is likely to produce noise (unwanted knowledge, data or information) along with the signal (suitable superior practice) (Trott 1993).

The Noise-to-Signal ratio is employed as a measure of signal strength relative to background noise. In mathematical terms, as the limit of the Noise-to-Signal ratio approaches zero then the limit of the noise will reach zero. Consequently, the lower the noise (unwanted data, information or knowledge) the lower the ratio. Cooley has employed the Noise-to-Signal ratio in organisational activities (Cooley 1987), shown in Figure 37.

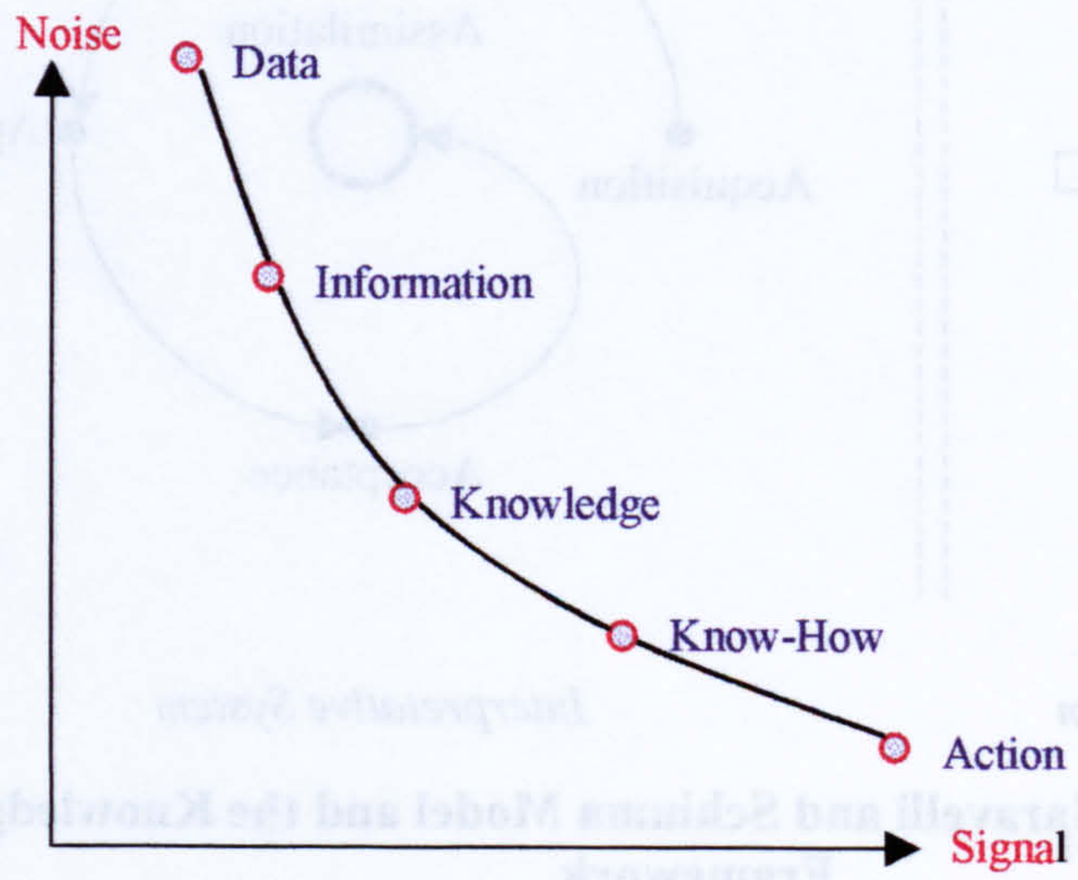

Figure 37: The Cooley Noise-to-Signal Ratio

As described in Section 5.2, data is a collection of facts, with no structure. When data is structured, organised, analysed or patterned, it can lead to information. While data is not specific and unstructured, information becomes more specific through an inference process. Knowledge is collectively the body of information possessed by a person or, by extension, a group of persons or a culture, as described in Chapter 2. Knowledge can include information that may not be relevant to a problem (Cooley 1987). Extracting know-how from knowledge involves identifying a specific group of actions that can lead to the solution of a problem, and a further refinement can occur through the identification of specific actions that can be applied to address a problem. In summary, to reduce noise, raw data must be refined to information, information must lead to

knowledge, knowledge must be further refined to provide know-how, and specific actions must be identified through know-how.

The Knowledge Transfer Framework can be mapped on the Cooley Noise-to-Signal ratio diagram. The Enterprise Assessment stage involved collecting data from the enterprises. Analysis of the data provided information on the strengths and weaknesses of the enterprise and identified possible communication problems. Comparison against other enterprises through Benchmarking provided knowledge on how the enterprise compared against other participant SMEs companies, and provided access to superior performances. The Focus Groups identified how superior performances are obtained, and provided enterprises with the opportunity to capture specific ideas or tasks concerning how superior performance was achieved in other enterprises. Every stage in the process provided more specific feedback that could lead to business improvement.

The Noise-to-Signal ratio for the three stages of the Knowledge Transfer Framework are shown in Figure 38.

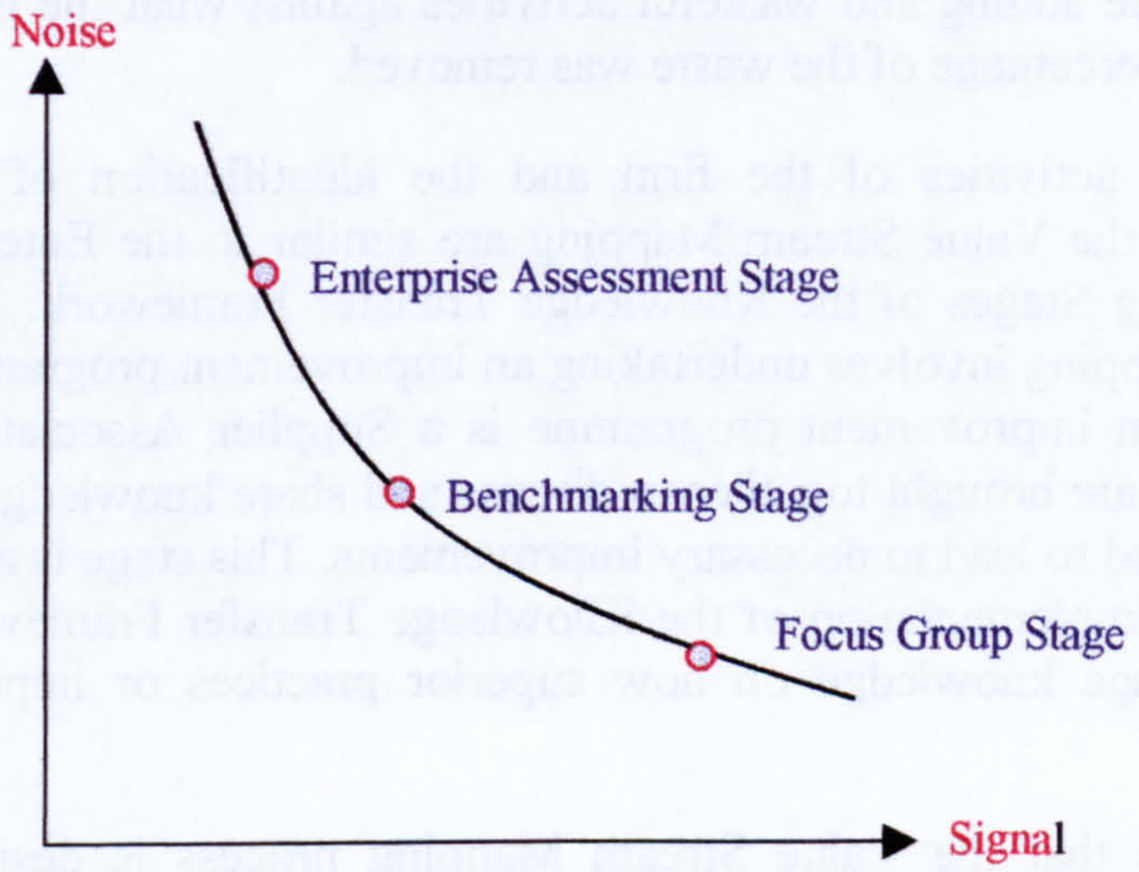

Figure 38: The Knowledge Transfer Framework Noise-to-Signal Ratio

The review of Benchmarking initiatives available to Small and Medium-sized Enterprises, in Section 4.5, indicated the lack of knowledge availability on how superior practices were achieved in leading enterprises. The Knowledge Transfer Framework differs from other SME Benchmarking practices as it provides enterprises with specific actions, or practices that could be implemented to improve under-performing enterprises, sourced from superior performing enterprises.

In effect the Knowledge Transfer Framework provides an assessment of enterprise performance, positions the company against other practices, and sources practices and actions that could lead to performance improvement from superior performing enterprises. The SME Benchmarking initiatives, described in Section 4.5 assess and position a participant company against other enterprises without providing knowledge on how their performance can be improved. Consequently, using the Cooley Noise-to-

Ratio diagram, the Knowledge Transfer Framework has lower Noise-to-Signal ratio than other SME Benchmarking Initiatives, and consequently, to use Cooley's words, it provides a "better tuned" business improvement practice.

8.5.4 Value Stream Mapping

Hines et. al describe an application of a new variant of process Benchmarking called Value Stream Mapping, to the development of a supplier network around a prominent distributor of electronic, electrical and mechanical components. This involves mapping the activities of a firm, identifying opportunities for improvement and then undertaking an improvement programme with the firm (Hines et. al. 1998).

Value stream mapping forms a type of specific process Benchmarking, where the initial performance is not externally compared with other enterprises, but internally compared with how good the process itself could be (Hines et. al. 1998). Consequently, it compares the value adding and wasteful activities against what the process might look like if a realistic percentage of the waste was removed.

The mapping of activities of the firm and the identification of opportunities for improvements of the Value Stream Mapping are similar to the Enterprise Assessment and Benchmarking Stages of the Knowledge Transfer Framework. The third stage of Value Stream Mapping involves undertaking an improvement programme with the firm. An example of an improvement programme is a Supplier Association (Hines 1994), where companies are brought together to discuss and share knowledge concerning what actions are required to lead to necessary improvements. This stage is also very similar to the Focus group implementation of the Knowledge Transfer Framework as companies share and exchange knowledge on how superior practices or improvements can be achieved.

The difference is that the Value Stream Mapping process is designed for supplier partnerships, and concentrates on specific topics such as New Product Development, Supplier Integration or New product Introduction. The Knowledge Transfer Framework can be employed to investigate a variety of topics, as discussed in Section 6.3.3.1, and participant enterprises can be from different industrial sectors with different Critical Success Factors. The advantage of participant enterprises being in the same supply chain is that trust and openness may be easier to acquire within a supply chain than between enterprises that have never met before.

8.5.5 Northumbria Competitiveness Model

The Competitiveness Project is a 3 year (1996-98), 8 ECU million project, 50% funded through Regional Challenge, designed to increase the competitiveness of the North East region in England by achieving a higher level of economic performance (Armstrong

1996). The project incorporates as a prime goal the promotion of the competitiveness of the SME base towards world class performance standards.

The Company Benchmarking initiative, as part of the Competitiveness Project, aims to achieve a higher level of regional prosperity by Benchmarking business performance and improving business support processes.. The first stage in Company Benchmarking relates to the data collection process. It involves the completion of a self-assessment booklet, covering areas such as operational processes, company culture and quality. The enterprise performance score is subsequently calculated and the company performance is compared against other businesses in the North East using the Practice-Performance Chart developed by IBM Consulting and London Business School (Yarrow 1998). The data collection and the analysis are based on a tool called PILOT.

The process is supported by Benchmarking workshops, which are co-ordinated by the University of Northumbria at Newcastle, where enterprises can engage in constructive discussions with other companies and find alternate solutions to their problems.

The Company Benchmarking under the Competitiveness project is similar to the Knowledge Transfer Framework. However, the enterprise assessment process is based on a single questionnaire, which increases the subjectivity of the results, whereas the Enterprise Assessment Stage of the Knowledge Transfer Framework sources data both horizontally and vertically in the participant organisation. Moreover, under the Competitiveness Model, there is no formal mechanism to source and extract knowledge from superior practices as Knowledge Transfer is based on ad-hoc discussions amongst the enterprises, whereas the Knowledge Transfer Framework is based on the identification of superior practices and the sourcing of knowledge on how they were achieved.

8.6 Learning Points

The principal outcome from the Focus Group discussion is that enterprises source practices, or activities that could lead to business performance. The better performers presented what has worked for their business and elaborated on how they implemented their superior practice, as discussed in Chapter 6,7 and 8.

The Knowledge Transfer Framework was employed to transfer knowledge from the better performing enterprises to the not-so-good performers. However, the author does not claim that the transferred actions or practices, which form knowledge of the superior performing enterprise, will become knowledge of the under-performing enterprise. This is supported by Albino et. al., who argue that information, actions or practices (other enterprise knowledge) must be submitted to an interpretation process within the organisation itself to become organisational knowledge (Albino et. al. 1999).

The majority of Benchmarking initiatives available to Small and Medium-sized Enterprises provide information on where Best Practice can be found, but do not

identify how it can be translated and realised in another organisation, as they are based on performance positioning principles (see Section 4.5). Benchmarking practices do not facilitate the translation of Benchmarking information into knowledge on how superior practices can be achieved, and subsequently provide limited Knowledge Transfer amongst participant enterprises.

Enterprises that are recognised as best practice case studies in a specific business process usually acquire limited benefits from other participant enterprises through the same study, discussed in Section 3.2.6. Benchmarking practices are often based on a one to-many comparisons between the best practice enterprise and participants in the Benchmarking study. The Knowledge Transfer Framework demonstrated that performance improvement activities and practices can be sourced from enterprises that are not the best overall companies in the database, but from enterprises that display a strength in a specific activity of their business. The Focus Group implementation proved that companies can learn how they could improve their underperforming areas of their business, and disseminate what practices and activities lead to superior performance in certain areas of their business. This lead to the successful implementation of Win-Win Benchmarking in Small Enterprises.

Following the completion of the feedback questionnaire, described in Section 7.3.3.3, the author asked the participant enterprises how they felt learning about better practices directly from other enterprises. All the companies responded that learning from similar sized enterprises was preferable to learning from a consultant or a lecturer. The author queried their responses and identified that the most important reason was that enterprises felt that better practices which were implemented in other similar-sized enterprises, seemed more easy to implement than suggestions from consultants or lecturers. Enterprises realised that other similar-sized enterprises had implemented practices which lead to superior performance, and envisaged that their company could implement these practices as well. Two companies said that through their experience consultants usually offer solutions which seem not applicable to their business (Ukhar and Ukind). This was acknowledged by other participant enterprises in the Focus Group.

The Knowledge Transfer Process provides a novel methodology for the application of Benchmarking practices in Small and Medium-sized Enterprises. Companies that participate in the process are provided with an identification of their strengths and weaknesses, are compared against other enterprises and learn specific actions and tasks which elaborate on how they could improve their performance based on knowledge sourced from superior performers in the Benchmarking database, as discussed in Chapter 6.

The Knowledge Transfer Framework demonstrated that there is no need for a large Benchmarking database to transfer organisational knowledge from superior performing enterprises to under-performing enterprises on how superior practices were achieved. The process was successfully conducted amongst eight enterprises as discussed in Chapter 7.

In conclusion, the authors' research was not involved with the importation of the superior performer enterprise knowledge into the organisational knowledge base of the underperforming enterprises. Models like the Gilbert-and Cordey-Hayes Model can be applied for the importation of knowledge within organisations.

8.7 Limitations

The author notes that some limitations and risks that must be considered prior to the implementation of the Knowledge Transfer Framework:

- The principal limitation of Knowledge Transfer in SMEs is that enterprises may not recognise the need to change or improve their business processes, due to the SME Knowledge Deficit, or may not have the right culture to accept or implement changes internally. To overcome this limitation, the author has set criterion for companies to participate in the Knowledge Transfer Framework, noted in Section 7.2. Companies that participate in the Knowledge Transfer Framework must be open to learning, willing to disseminate and receive knowledge and to apply better practices sourced from superior performances within their organisation, and to change old practices. Participant enterprises need to have the culture to change and learn from Benchmarking.

- The company database can be stored on the Internet at secure Web servers using encryption technology to provide data storage, access and retrieval services to all providers, thus ensuring national or international application of the framework. However, a significant amount of programming effort was required to established the Internet based operations, which can be costly if conducted under business terms.

- The Enterprise Assessment questionnaire was originally developed for completion by enterprise managerial staff. The questionnaire was validated in 240 Small and Medium-sized Enterprises, but no data collection was conducted from shop-floor employees. The author introduced some changes to simplify some of the questions, however, it was still noted that some shopfloor employees had still some difficulty in completing the questionnaire.

- The Enterprise Assessment questionnaire requires altering to accommodate the new EFQM model, which will be released in April 1999. The Knowledge Transfer Framework has been developed to be model independent.

8.8 Conclusive Remarks

The author has conceived, developed and implemented a Knowledge Transfer Framework based on an advanced application of Benchmarking to stimulate improvements in Small and Medium-sized Enterprises. The implementation methodology focuses on overcoming the Knowledge Deficit obstacle for Small and Medium-sized Enterprises, described in Section 5.5. The framework provides a structured approach to extract superior performance practices from companies, which can be classified as better performers, and was successfully applied and validated in a portfolio of Small sized Enterprises in Bedfordshire, United Kingdom.

The Knowledge Transfer Framework offers an exciting opportunity for the transformation of SME Benchmarking Practices from a "one-to-many" Best Practice performance comparison to a "Multi-Directional" Superior Performance Knowledge Transfer through the implementation of Win-Win Benchmarking practices, as described in Section 3.2.6. It provides a novel approach for Benchmarking in Small and Medium-sized Enterprises, as enterprises learn specific practices and actions that can be implemented to improve their performance. The process involves establishing Win-Win Benchmarking partnerships, which enable enterprises to learn for each others strengths as described in Sections 6.3.2.2 and 7.4, resulting into both enterprises benefiting from the Benchmarking process.

Chapter 9 Conclusion

9.1 Synopsis

This Chapter provides an overview of the research, summarises the novelty of the work and outlines areas for future work following the research.

9.2 Overview

The purpose of this thesis could be summarised as: *"To Learn (Acquire Knowledge) from Better Practices to Decrease Knowledge Deficit"*.

The author has conceived, developed and implemented a Knowledge Transfer Framework based on an advanced application of Benchmarking to stimulate improvements in Small and Medium-sized Enterprises. The implementation methodology focuses on overcoming the Knowledge Deficit obstacle for Small and Medium-sized Enterprises, described in Section 5.5. The framework provides a structured approach to extract superior performance practices from companies, which can be classified as better performers.

The first stage of the process incorporates the enterprise assessment. The process is conducted through the use of a self-assessment questionnaire based on the European Foundation for Quality Management Business Excellence Model, and is based on qualitative and quantitative data collected both horizontally and vertically in the enterprise. The outputs of this stage are identification of enterprise strengths and weaknesses and verification of possible intra-enterprise communication problems. This is a critical step, which provides the profile of the company, identifies communication problems within the company, provides an understanding of the strengths and

weaknesses of the business and analyses their correspondence with the critical success factors affecting the business.

The second stage involves mapping the profile of the company on a performance grid, to position the company against external practices. This stage provides the participant SMEs with a comparative analysis of their performance against other company performance levels. The third and final stage forms the most important element of the framework. Through the implementation of focus group meetings, better practices and superior performance activities are disseminated, leading to the provision of task defined solutions towards enhancing corporate performance.

The objective of the Knowledge Transfer Framework is to provide a diagnosis of company strengths and weaknesses, and to make recommendations for improvement sourced from superior performances by sourcing and transferring knowledge from better performing enterprises. The Knowledge Transfer Framework focuses on the implementation of Win-Win Benchmarking practices amongst participant Enterprises.

To design the SME Knowledge Transfer Framework, the author has identified a set of prerequisites for the application of Knowledge Transfer in Small and Medium-sized Enterprises, which are presented in Section 5.8, and have been based on the literature. The framework is prescriptive in the early stages to focus attention on the process, and becomes less prescriptive as the implementation progresses, allowing participant enterprises to learn specific solutions to fit their particular situation.

9.3 Novelty

The conclusions regarding the research novelty are based on the establishment of the Knowledge Transfer Process and Framework (Chapters 5 and 6), on the application of the Knowledge Transfer Framework (Chapter 7) and on the elaboration Chapter concerning the application of the Knowledge Transfer Framework (Chapter 8).

In terms of the realisation of the Knowledge Transfer Framework, the research programme provides the following areas of novelty:

- The Knowledge Transfer Framework employs Knowledge-Based potential within superior performing enterprises to enhance the performance of Small Enterprises, discussed in Chapter 6. The method to extract activities and practices from better performing enterprises relating to how superior performance was achieved represents an original contribution to the area of Small Company Benchmarking.

- Another contribution of this work is the establishment of Win-Win benchmarking practices between Small Enterprises. Enterprises that are employed as best practice case studies in a specific business process usually acquire limited benefits from other participant enterprises in the same study, leading to an unequal information flow which disadvantages the better enterprises. The establishment of Win-Win

Benchmarking practices leads to bi-directional information flow, where both the enterprise displaying the best practice and the under-performer enterprise, can secure benefits. The use of Win-Win Benchmarking signified a shift from a single-vectored "One-to-Many" Benchmarking to a "Multi-Directional" Benchmarking. The establishment of a methodology to support Win-Win Benchmarking between Small-sized Enterprises represents an original contribution of this work.

- The use of the Knowledge Transfer Framework sources superior performance knowledge from better performing enterprises, to provide specific recommendations on how superior practices can be achieved. The Knowledge Transfer Framework is realised through the integration of Self-Assessment, Benchmarking and Focus Group implementation and denotes a shift from Performance Comparison based Benchmarking to a Superior Practice Knowledge Transfer Benchmarking.

In terms of the outcomes of the research, novelty can be ascribed to the following elements of the research:

- The research demonstrated that Benchmarking practices could be employed as a basis for inter-organisational Knowledge Transfer, related to the implementation of better practices, in Small and Medium-sized Enterprises operating in Manufacturing or related industrial sectors, employing less than 50 employees.

- The research demonstrated that Win-Win Benchmarking can occur between Small and Medium-sized Enterprises operating in Manufacturing or related industrial sectors, employing less than 50 employees.

- The research proved that there is no need to have a large Benchmarking database to enable superior performance Knowledge Transfer in Small and Medium-sized Enterprises operating in Manufacturing or related industrial sectors, employing less than 50 employees.

9.4 Future Work

The further research topics suggested in the section build upon the approach suggested in this thesis.

- The Knowledge Transfer Framework was tested in enterprises with below 50 employees. The framework could be applied in larger sized enterprises. Comments received from larger enterprises such as Lloyds Bank and British Aerospace suggest that it could be applied amongst large enterprises. Further research needs to be conducted to verify if the framework can be applied to any enterprise, regardless of size, and what level of customisation is required for its wide application.

- The Knowledge Transfer Framework was tested in enterprises in the United Kingdom, but was developed to support transnational Knowledge Transfer. Further

research needs to be conducted to assess the validation of the framework at a transnational level.

- Further work is also required to investigate the level of integration of the Knowledge Transfer Framework with intra-enterprise knowledge importation methodologies, such as the Gilbert-and Cordey-Hayes Model.

- The Knowledge Transfer Framework could be further developed into an intelligent manufacturing management decision support tool. The tool can incorporate an enterprise assessment and Benchmarking process to diagnose the performance of an enterprise (diagnostic Benchmarking) and illustrate the potential to use expert system technology to enhance company performance beyond current Best Practices. An assessment model will be employed to extract information from current superior performers, while Artificial Intelligence rules will be used to introduce the innovation element in the assessment process. The process can be supported through an Internet based tool to improve the accessibility of Best Practice across regional and national boundaries. The result will be the advanced application of an intelligent management decision support tool, involving a process of continuously measuring and comparing an organisations performance against superior performance, in a similar or disparate industrial sector, to gain information and knowledge on how premium performance can be attained. This development forms the basis of a proposal for a European Commission funded research project called "Intelligent Benchmarking", lead by Cranfield University with potential partners from Austria, Finland, France, Germany, Ireland, The Netherlands, Norway, Switzerland, and the United Kingdom.

- The author demonstrated that the Knowledge Transfer Framework can be employed to extract practices and actions from better performing enterprises, which can be employed to ameliorate the performance of under-performing companies. The EFQM model has been employed as the basis of enterprise assessment and performance Benchmarking. The framework is model independent and the EFQM model could be replaced by another performance assessment model such as the Balridge Award model or the UK Benchmarking index. A follow up project from the thesis will be submitted to the Department of Trade and Industry, United Kingdom, to examine the applicability of existent enterprise assessment and improvement models, such as the UK Benchmarking Index and the Inside UK Enterprise Initiative, with the Knowledge Transfer Framework. This project could lead to the adoption of the Knowledge Transfer Framework as a basis for Benchmarking activities offered to Small and Medium-sized Enterprises in the United Kingdom.

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Appendix A: Enterprise Assessment Models

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The Deming Application Prize Checklist for 1996

ITEMS CHECKING POINTS

1. Policies (Hoshin)

1 Quality and quality control policies and their place in overall business management
2 Clarity of policies (targets and priority measures)
3 Methods and processes for establishing policies
4 Relationship of policies to long - and short - term plans
5 Communication (deployment) of policies, and grasp and management of achieving policies
6 (Executives and managers leadership

2. Organisation

1 Appropriateness of the organisational structure for quality control and status of employee involvement
2 Clarity of authority and responsibility
3 Status of interdepartmental co-ordination
4 Status of committee and project team activities
5 Status of staff activities
6 Relationships with associated companies (group companies, vendors, contractors, sales companies, etc.)

3. Information

1 Appropriateness of collecting and communicating external information
2 Appropriateness of collecting and communicating internal information
3 Status of applying statistical techniques to data analysis
4 Appropriateness of information retention
5 Status of utilising information
6 Status of utilising computers for data processing

4. Standardisation

1 Appropriateness of the system of standards
2 Procedures for establishing, revising and abolishing standards
3 Actual performance in establishing, revising and abolishing standards
4 Contents of standards
5 Status of utilising and adhering to standards
6 Status of systematically developing, accumulating, handing down and utilising technologies

5. Human resources

1 Education & training plans, their development and use of results
2 Status of quality consciousness, consciousness of managing jobs, and understanding of quality control
3 Status of supporting and motivating self-development and self-realisation
4 Status of understanding and utilising statistical concepts and methods
5 Status of QC circle development and improvement suggestions
6 Status of supporting the development of human resources in associated companies

6. Quality assurance

1 Status of managing the quality assurance activities system
2 Status of quality control diagnosis
3 Status of new product and technology development (including quality analysis, quality deployment and design review activities)
4 Status of process control
5 Status of process analysis and process improvement (including process capability studies)
6 Status of inspection, quality evaluation and quality audit
7 Status of managing production equipment, measuring instruments and vendors
8 Status of packaging, storage, transportation, sales and service activities
9 Grasping and responding to product usage, disposal, recovery and recycling
10 Status of quality assurance
11 Grasping of the status of customer satisfaction
12 Status of assuring reliability, safety, product liability and environmental protection

7. Maintenance

1 Rotation of management (PDCA) cycle control activities
2 Methods for determining control items and their levels
3 In-control situations (status of utilising control charts and other tools)
4 Status of taking temporary and permanent measures
5 Status of operating management systems for cost, quantity, delivery, etc.
6 Relationship of quality assurance system to other operating management systems

8. Improvement

1 Methods of selecting themes (important activities problems and priority issues)
2 Linkage of analytical methods and intrinsic technology
3 Status of utilising statistical methods for analysis
4 Utilisation of analysis results
5 Status of confirming improvement results and transferring them to maintenance/control activities
6 Contribution of QC circle activities

9. Effects

1 Tangible effects (such as quality, delivery, cost, profit, safety and environment)
2 Intangible effects
3 Methods for measuring and grasping effects
4 Customer satisfaction and employee satisfaction
5 Influence on associated companies
6 Influence on local and international communities

10. Future plans

1 Status of grasping current situations
2 Future plans for improving problems
3 Projection of changes in social environment and customer requirements and future plans based on these projected changes
4 Relationships among management philosophy, vision and long-term plans
5 Continuity of quality control activities
6 Concreteness of future plans

The Deming Application Prize Checklist

FOR SENIOR EXECUTIVES

I. Understanding

1 Are the objectives of quality control and enthusiasm introduction and promotion clearly defined and well understood?

2 How well do they understand quality control, quality assurance, reliability, product liability, etc.?

3 How well do they understand the importance of the statistical way of thinking and the application of quality control techniques?

4 How well do they understand QC circle activities?

5 How well do they understand the relationship of quality control and the concepts and methods of other management activities?

6 How enthusiastic are they in promoting quality control? How well are they exercising leadership?

7 How well do they understand the status and the characteristics of their company's quality and quality control?

2. Policies

1 How are quality policies and quality control policies established? Where and how do these policies stand in relation to overall business management?

2 How are these policies related to short- and 5long-term plans?

3 How are these policies deployed throughout the company?

4 How do they grasp the status of policy achievement? Are they taking appropriate corrective actions when needed?

5 How do they grasp priority quality issues (priority business issues)? Do they make effective use of diagnostic methods?

6 How well are targets and priority measures aligned with policies?

7 What kind of policies do they employ for establishing co-operative relationships with associated companies?

3. Organisation

1 How is the company organised and managed to human resources effectively and efficiently practice quality control?

2 How are the authorities and responsibilities in the organisation established?

3 Is the allocation of human resources suitable for the organisation?

4 How do they strive to make employers happy and satisfied?

5 How do they grasp and evaluate employee's capability and motivation levels?

6 How do they strive interdepartmental co-operation? How do they utilise committees and project teams?

7 How do they relate to associated companies?

4. Human resources

1 How clear is the philosophy for hiring, development developing and utilising human resources?

2 How appropriate are the employee education and training plans? Are the necessary budget and time allocated?

3 How do they communicate the policies for quality control education and training and how do they grasp the status achieving their policies?

4 How do they provide education and training specific to the company's business needs?

5 How well do they understand the importance of employee self- and mutual-development? How do they support this effort?

6 How do they strive to develop QC circle activities?

7 How interested are they in developing human resources in associated companies?

5. Implementation

1 What kind of measures do they have for the effective and efficient implementation of quality control?

2 How well is the overall co-ordination of quality control and other management systems?

3 How do they grasp the status of improvement in the business processes and the individual steps of these processes so as to provide products and services that satisfy the customer needs? Are they taking necessary corrective actions?

4 How well are the systems for developing new products and services, new technologies and new markets established and managed?

5 How well are the necessary resources secured and allocated for establishing and operating management and information systems?

6 How do they grasp the effects and contributions of quality control to the improvement of business performance?

7 How do they evaluate their employees efforts?

6. Corporate social

1 Is the company structured to ensure responsibilities appropriate profits for a long time?

2 How well do they regard employer well being ?

3 How well do they regard employee self-realisation?

4 How well do they strive for co-existence and co-prosperity with associated companies?

5 How well does the company contribute to the local community?

6 How well does the company exert efforts to protect the environment?

7 How well does the company positively impact the international community?

7. Future visions

1 How do they assure the continuity of and future plans quality control?

2 How do they anticipate and cope with changes in surrounding business environment and progress in science and technology?

3 How do they grasp and cope with changes in customer requirements?

4 How do they consider their employees and help them achieve happiness and satisfaction?

5 How do they consider and manage relationships with associated companies?

6 How do they plan for the future to cope with the items above?

7 How do they utilise quality control to achieve the future plans?

Malcolm Baldrige National Quality Award Model (1997)

1. Leadership	**110**	
1.1- Leadership System		80
1.2- Company Responsibility and Citizenship		30
2. Strategic Planning	**80**	
2.1- Strategy Development Process		40
2.2- Company Strategy		40
3. Customer and Market Focus	**80**	
3.1- Customer and Market Knowledge		40
3.2- Customer Satisfaction and Relationship Enhancement		40
4. Information and Analysis	**80**	
4.1- Selection and Use of Information and Data		25
4.2- Selection and Use of Comparative Information and Data		15
4.3- Analysis and Review of Company Performance		40
5. Human Resource Focus	**100**	
5.1- Work Systems		40
5.2- Employee Education, Training, and Development		30
5.3- Employee Well-being and Satisfaction		30
6. Process Management	**100**	
6.1- Management of Product and Service Processes		60
6.2- Management of Support Processes		20
6.3- Management of Supplier and Partnering Processes		20
7. Business Results	**450**	
7.1- Customer Satisfaction Results		125
7.2- Financial and Market Results		125
7.3- Human Resource Results		50
7.4- Supplier and Partner Results		25
7.5- Company-Specific Results		125
TOTAL POINTS	**1000**	

EFQM Business Excellence Model (1997)

1 Leadership			**100**
	1a	Visibly demonstrate their commitment to a culture of TQM	
	1b	Support improvement and involvement by providing appropriate resources and assistance.	
	1c	Leaders are involved with customers, suppliers or other companies	
	1d	Recognise and appreciate people's efforts and achievements.	
2 Policy and Strategy			**80**
	2a	Based on information, which is relevant and comprehensive.	
	2b	Developed.	
	2c	Communicated and implemented.	
	2d	Regularly updated and improved.	
3 People Management			**90**
	3a	Resources are planned and improved.	
	3b	Capabilities are sustained and developed.	
	3c	Agree targets and continuously review performance.	
	3d	Are involved, empowered and recognised.	
	3e	And the organisations have an effective dialogue.	
	3f	Cared for.	
4 Resources			**90**
	4a	Financial resources are managed.	
	4b	Information resources are managed.	
	4c	Supplier relationships and materials are managed.	
	4d	Buildings, equipment and other assets are managed.	
	4e	Technology and intellectual property are managed.	
5 Processes			**140**
	5a	key to the success of the business are identified.	
	5b	are systematically managed.	
	5c	are reviewed and targets are set for improvement.	
	5d	are improved using innovation and creativity.	
	5e	are changed and the benefits evaluated.	
6 Customer Satisfaction			**200**
	6a	the customers perception of the organisations products, services and customer relationships.	
	6b	additional measurements relating to the satisfaction of the enterprises customers.	
7 People Satisfaction			**90**
	7a	the peoples perception of the organisation.	
	7b	additional measurements relating to people satisfaction.	
8 Impact on Society			**60**
	8a	society's perception of the organisation.	
	8b	additional measurements of the organisations impact on society as a whole.	

9 Business Results		**150**
	9a financial measurements of the organisations performance	
	9b additional measurements of the organisations performance	
		1000
TOTAL POINTS		

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Appendix B: ESPRIT ENAPS Programme

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Introduction

ENAPS stands for European Network of Advanced Performance Studies. The objective of the programme is to collect and transfer knowledge about "best practices", and establish and run a European network for performance studies in European industry. Composed of partners, agents and clients the network is submitting benchmarks for Performance Measurement to European industry as well as best practices initiating improvement projects. The project is funded by the European Commission's ESPRIT program under project number 20 888

ENAPS is composed of leading industry, academic partners and agents. The nodes of the network in the countries are referred to as agents. Cranfield University is the agent for England. This network is covering almost all of the countries in the European Union and the European economic area providing a structure usually only large consultancies possess. Main industrial sectors are electronic, aerospace and automotive with an the long-term focus on SMEs. ENAPS provides necessary methods for Benchmarking as a typology for Benchmarking cases, a process model and performance indicators.

To handle information IT-tools were developed: A tool for data collection, a database forming the heart of the network for information exchange and a tool to visualise differences in performance by the indicators. Resulting gaps in performance need information about possibilities for improvement. ENAPS offers best practices identified also by the indicators together with a systematic approach for improvement.

The ENAPS Network

One of the basic ideas of the project is to establish a network throughout Europe to collect data from and for European Industry. Today from almost every country from Europe there is at least one member in ENAPS. The partners of the network are responsible for development of methods and tools as well as for setting up the network. They contracted agents, which are mostly consulting companies. The agents are the intermediates between ENAPS and the organisations who want to participate in ENAPS: They establish contact to industry, the ENAPS-clients, and add value by guiding data collection, performing queries as having access to the database for Benchmarking and facilitate improvement projects at the companies site. The clients, last but not least, are the main target group of ENAPS as they are the real beneficiaries. They give measures through the agents into the database - the fundamental information for comparison - for evaluating the efficiency of the company's processes by indicators.

ENAPS Process Model

To define what performance actually is and to measure the performance ENAPS required the definition of processes. Starting point was the development of a business model incorporating all functions of a manufacturing enterprise including the recycling of products. With links to customer, supplier, recycler and service provider various functions within a manufacturing system were described. Analysing the technical and business information as well as the material flow business processes and secondary processes were defined and mapped to the functions of the manufacturing system.

The outcomes are the ENAPS business processes as product development, obtaining customer commitment, order fulfilment and customer services as well as the secondary processes, the support and the evolution process.

The investigated processes were summarised in the ENAPS process model. The business and the support processes are defined by their scope fulfilling defined functions as described in figure for the business processes. The sequence of functions must be defined for each category according to the ENAPS typology. Those functions themselves might be decomposed again showing the process they fulfil - considering the level of investigation in the Benchmarking case. This structure of the ENAPS process model composed of processes fulfilling functions was chosen as performance indicators evaluate the function of a process: The indicator's value is monitoring the "functionality" of the process. To improve the function as monitored by the indicator the process needs to be analysed on operational level.

Performance Indicators

Based on the typology and the process model in the last step the indicators are to be defined. The Benchmarking case is initiated by the uses of performance indicators. The performance indicator presents the effectiveness and/or efficiency of a part or whole of the process or function against the given indicator coming from the database. All together there are 80 indicators based on 94 measures. Each client has the choice of how many and by which anonymity he likes to hand in his measures.

ENAPS recognised three different, but inter-linked categories for enterprise performance indicators

Business level: Financial and other high level measures referring to the enterprise in total.

Function level: Measures of the functions as for procurement and inbound logistics involved in the customer order fulfilment process and specified in the ENAPS indicators.

Process level: Measures coming from the operational level when executing the processes as the customer order fulfilment. This is the highest level of detail and mostly difficult to be obtained.

Appendix C: ESF ADAPT CORE Programme

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Introduction

The ADAPT CORE project has been established to assist Small and Medium Sized Enterprises in Bedfordshire and Tyneside in the United Kingdom. The project is funded through the European Social Fund and is directed by the Bedfordshire County Council. It seeks to provide companies with the necessary tools and innovation and to encourage them to work collaboratively to identify common needs and possibilities for innovation to improve their competitive position and to produce effective and long term solutions for the sustainability of SMEs.

The focus of the CORE project is on both companies and individuals from the engineering and manufacturing sectors, although this is not exclusive. Companies eligible for support will be under threat by supply chain pressures who employ no more than 50 full time employees. Individuals may receive benefit from the project if they are under threat of redundancy, reduction in hours and/or redeployment or recently made unemployed due to industrial restructuring.

Aims and Objectives

The aims and objectives of the programme are to:

1. Assist SMEs to reduce manufacturing lead time, improve product development time, improve customer service, reduce inventory and increase responsiveness to customers and the business environment
2. Promote closer working links within supply chains
3. Promote closer collaborative alliances
4. Improve the learning potential of human resources
5. Improve the potential for exploitation of innovation
6. Improve the survival rate of new business start-up companies
7. Secure local employment
8. Promote environmentally aware techniques
9. Generate new employment potential t
10. Promote Equal Opportunities among all employees
11. Synergy with pre-existing schemes
12. Contribute to current business development practices
13. Promote closer European Union integration and cohesion

Services to Small and Medium-sized Enterprises

The ADAPT CORE programme offers a wide range of services to Small and Medium Enterprises in the United Kingdom.

Common Interest Groups

SMEs of below 50 employees will be encouraged to cluster together to find solutions to common issues in the management of a developing SME. The project will be developed and maintained under the

supervision and facilitation of management experts from the Universities. Demand led issue specific workshops and business clubs will be supplemented by current international knowledge. The project is enhanced by the participation of major manufacturers in the region. Management experts from the Universities will act as facilitators. The subjects will be chosen by company demand, and will address specific issues raised by the companies taking part.

Intervention Programme

Participating SMEs will be provided with a comprehensive management needs analysis. The company will be encouraged to implement the recommendations from the analysis under the supervision of the University. Where these recommendations require further training the appropriate provider will be sought through CORE.

This programme allows companies in depth support to identify and manage change in their organisation. This support programme is available for both manufacturing and service sectors companies. The duration of the support will depend on the scale of company change agreed, and of course, the changes will proceed at a pace the company finds appropriate.

Business Needs Analysis

The Needs Analysis programme is very similar to the Intervention Programme except the SME will be encouraged to undertake a much more proactive role in its future development. Participating companies will be provided with a comprehensive management needs analysis, with a University providing a guardian relationship. Student placements are available to the SME under the guidance of the University Professors. The analysis will identify training needs, if any, identifying those which are critical to the company's success.

Supply-Chain Counselling

Assistance will be provided by business advisors via one to one counselling, work shops, seminars and conferences. Action will be guided by major OEMs and supply chain counselling experts.

Environmental Counselling

An Environment Advisor will be placed in Business Link Bedfordshire to provide advice to Bedfordshire SMEs. The Environmental Adviser will also provide a signpost to the extensive number of activities already in existence in the county. The objective will be to create an improvement in the business commercial performance as well as improve the environment. The support will be carefully matched to the exact needs of the individual company. Beside the improvement in business performance, the organisation will benefit from improved environmental awareness and commitment from the workforce.

Transnational Benchmarking

Enterprises that participate in the Needs Analysis programme are invited to participate in the transnational Benchmarking activities, developed, conceived and implemented by the author. Participant enterprises participate in local Benchmarking activities and are provided with the opportunity to compare their p[performance with other similar sized enterprises in Spain and Germany. The process is supplemented through the use of an Internet based tool.

Appendix D: Enterprise Assessment Questionnaire

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Confidential Questionnaire
(Revised 1998)

Cranfield UNIVERSI

The CIM Instit

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United Kingd
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Fax: +44 (0)1234 750-
Email: A.Skandalakis@cranfield.a

Enterprise Assessment Questionnaire

Company Code Name:	Questionnaire No:

INTRODUCTION

Dear Employee:

As you were briefed, this questionnaire provides the basis for an assessment of your company, using the European Company Excellence Model. The results obtained from this assessment will be employed to define more focused targets for improvement, and provide the opportunity for your personal opinions to be heard by the management team, anonymously.

Please note that in order to make the questionnaire easy to complete, it has been necessary to simplify the wording of the questions and to limit their number. This might make the questionnaire appear to be too general, but it is sufficiently precise to define more concrete objectives for improvement and provide a thorough overview of the entire business.

Please complete the questionnaire by either ticking the appropriate box, or by assigning your immediate response in the appropriate box, using the following scale:

Score Between	Description
0% - 20 %	Anecdotal situation - nothing or very little done.
21 % - 40 %	Some ideas, which are being acted upon to some extent. Little practical effect.
41 % - 60 %	There is some evidence of the criteria being satisfied. Reviews are not very systematised.
61 % - 80 %	Well-grounded methodologies based on forward planning, with periodic reviews in response to data. Not all areas of the company are covered.
81 % -100 %	All criteria are satisfied, with very solid management methodologies, which are periodically reviewed.

An illustrated example is provided for your assistance. **Please note that only one tick or value is required per question.**

1.a. **Section**
The management team shows clear and open communication with its workers.

0–20	21–40	41–60	61–80	81–100
		✔		

OR

1.a. **Section**
The management team shows clear and open communication with its workers.

0–20	21–40	41–60	61–80	81–100
		50		

For any questions, please contact the process champion, who is:

SECTION A LEADERSHIP

1.a. Section

The management team shows clear and open communication with its workers.

The management team leads by example, and follows the principles of continuous improvement

Managers provide training to their workers.

Managers undergo frequent training.

0–20	21–40	41–60	61–80	81–100

I.b. Section

The management team assesses employee awareness with regard to total quality

The management team takes part in reviewing quality progress.

The management team always appreciates the efforts made by individuals and teams.

The management team acknowledges the achievements of individuals, teams, clients and suppliers.

0–20	21–40	41–60	61–80	81–100

I.c. Section

The management provides the necessary resources and support for improvement activities.

The management takes initiatives to meet with clients in order to understand and satisfy their needs.

The management takes initiatives to meet with suppliers in order to understand and satisfy their needs.

Managers personally participate in activities designed to promote total quality outside the company.

0–20	21–40	41–60	61–80	81–100

SECTION B POLICY AND STRATEGY

2.a. Section

The company gathers and uses information obtained from its clients (surveys, meetings, etc.).

The company gathers and uses information obtained from the field (market studies, reports, etc.).

The company gathers and uses information obtained from its employees (surveys, etc.).

The company gathers and uses information obtained from it suppliers (meetings, reports, etc.).

0–20	21–40	41–60	61–80	81–100

2.b. Section

The company involves its personnel in the implementation of realistic plans and objectives.

The overall objectives of the company form the basis for defining departmental and individual objectives.

The company establishes adequate plans and objectives which are coherent with its strategy.

The company has a good method for reviewing the effectiveness of its plans and strategies, and for correcting these when they fail to produce the desired results.

0–20	21–40	41–60	61–80	81–100

2.c. Section

The company communicates its plans and objectives to all personnel.

All employees understand their objectives.

The company ensures that clients and suppliers are kept informed of any significant changes to its overall plans.

0–20	21–40	41–60	61–80	81–100

SECTION C PEOPLE MANAGEMENT

3.a. **Section**

Personnel management planning is periodically reviewed.

Recruitment plans are used; the effectiveness of these is reviewed, and improvements are incorporated systematically.

Training plans are used; the effectiveness of these is reviewed, and improvements are incorporated systematically.

Promotion plans are used; the effectiveness of these is reviewed, and improvements are incorporated systematically.

The company agrees and reviews objectives with individuals and teams.

The company assesses individual performance.

0–20	21–40	41–60	61–80	81–100

3.b. **Section**

The company facilitates participation by all employees in the continual improvement of products, services and processes, and in the taking of decisions.

The company encourages its personnel to make decisions and implement changes within clearly agreed parameters.

The method used for top down and bottom up communication is efficient, and is periodically reviewed in order to introduce new improvements.

0–20	21–40	41–60	61–80	81–100

SECTION D RESOURCES

4.a. **Section**

The method used for planning and controlling the principal balance sheet elements (clients, suppliers, fixed assets, etc.) is consistent with the company's strategy.

The company distributes and utilises financial resources in a manner that supports its objectives for the future.

The company adequately manages financial risks.

0–20	21–40	41–60	61–80	81–100

4.b. **Section**

The company's approach to information management ensures that all data on products, services, processes, clients, suppliers and competitors is easily accessible to and usable by interested parties.

The company ensures that all employees are provided with adequate information in order to carry out their work.

The company ensures the security, accessibility and accuracy of information.

0–20	21–40	41–60	61–80	81–100

4.c. **Section**

The company has a method which enables it continually to improve the control and efficient use of its material resources (fixed assets, buildings, equipment, etc.).

The company has a method which enables it continually to improve the control and efficient co operation with its suppliers.

0–20	21–40	41–60	61–80	81–100

4.d. **Section**

The company has a routine system for identifying, evaluating and incorporating new technologies

The company manages and optimises the use of its intellectual property (i.e. patents, brands, etc.)

0–20	21–40	41–60	61–80	81–100

SECTION E PROCESSES

5.a. **Section**
The company has a method for managing its quality system, such as ISO 9000 standards.

0–20	21–40	41–60	61–80	81–100

5.b. **Section**
The company has a system for detecting the needs of its clients, and uses the information so obtained to improve its products and services.
The company actively fosters a close relationship with its clients.

0–20	21–40	41–60	61–80	81–100

5.c. **Section**
Processes are supervised by a designated responsible person or owner.

There are defined standards for processes.

Products or services are improved in response to client requirements.

The company ensures regular delivery of its products or services in accordance with the requirements of its clients.

0–20	21–40	41–60	61–80	81–100

5.d. **Section**
The company identifies its key processes.

The company establishes monitoring indicators, and sets objectives.

The company uses a consistent method for introducing changes.

0–20	21–40	41–60	61–80	81–100

SECTION F CUSTOMER SATISFACTION

6.a. **Section**
The company measures the satisfaction of its clients.

0–20	21–40	41–60	61–80	81–100

6.b. **Section**
The results of these measurements show a positive trend over the last 3 to 5 years in terms of:

The company's ability to comply with product or service specifications.

The reliability of products or services.

The punctuality of deliveries.

Responsiveness.

The processing of complaints.

The operation of its technical service.

The implementation of guarantees.

0–20	21–40	41–60	61–80	81–100

6.c. **Section**
The company has a low complaint rate.

Clients send large numbers of greetings cards, rewards, or 'good supplier' certificates.
The company receives progressively larger orders from its regular clients.

0–20	21–40	41–60	61–80	81–100

SECTION G PEOPLE SATISFACTION

7.a. **Section**
The company measures the satisfaction of its employees.

0–20	21–40	41–60	61–80	81–100

7.b. **Section**
The results of these measurements show a positive trend over the last 3 to 5 years in terms of:

0–20	21–40	41–60	61–80	81–100

Satisfaction with the working environment.

Health and safety provisions.

Internal communication systems.

Recognition and reward systems for achievements

Profit sharing systems

The style of management.

Ongoing training.

7.c. **Section**
The company shows low rates of absenteeism.

There is a very low rate of staff turnover.

The accident rate, and the seriousness of the accidents involved, is progressively lower.

0–20	21–40	41–60	61–80	81–100

SECTION H IMPACT ON SOCIETY

8.a. **Section**
The company is familiar with the perceptions of the local community with regard to its activities.
The company actively involves itself in various cultural, sporting, social and environmental initiatives.

0–20	21–40	41–60	61–80	81–100

8.b. **Section**
The company takes initiatives to reduce the quantity of waste products and noise levels.
The company takes initiatives to prevent health and safety hazards.

The company takes initiatives to use recycled materials.

The company takes initiatives to reduce water and power consumption

0–20	21–40	41–60	61–80	81–100

SECTION I BUSINESS RESULTS

9.a. **Section**

The economic/financial indicators show a positive long term trend over the last 3 to 5 years, and compare well with the company's objectives and with its competitors:

	0–20	21–40	41–60	61–80	81–100
Sales.					
Profits.					
Unit costs.					
Financial costs.					
Dividends.					

9.b. **Section**

The indicators of non financial management (e.g. market share, defect rates, cycle times for principal processes) show a positive long term trend over the last 3 to 5 years, and compare well with the company's objectives and with its competitors:

	0–20	21–40	41–60	61–80	81–100
Market share.					
Defect rates.					
Product development times.					
Order response times.					

SECTION J EMPLOYEE DETAILS

Managerial Staff: **Yes:** ☐ **No:** ☐

For Office Use

Date Received _____

Date Uploaded _____

Appendix E: Enterprise Qualitative Interview

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This questionnaire was employed to conduct the qualitative data collection inside the enterprise, to enable the process administrator gain a good understanding of the company, its products and processes. The questionnaire was employed in the ADAPT-CORE Needs Analysis for Small and Medium-sized Enterprises, and the quantitative data collection process of the Knowledge Transfer Framework. The questionnaire is based on selected questions from a best practice manufacturing checklist developed at the Cranfield Innovative Manufacturing Consultancy, Cranfield University, in 1995, and which was employed for the World Class Manufacturing Initiative in Bedfordshire. The CIM Institute, Cranfield University, retains the copyright of both documents.

Knowledge Transfer Process Qualitative Questionnaire

1) Business Strategy and Planning

Do you have a clear vision of:

- The company ethos that you wish to foster, in terms of the values, standards and principles demonstrated by management and employees
- Where you would like the company to be in say two years time?
- The critical success factors (CSF) that will ensure you reaching this objective?

Do you see the company as:

- Innovative and market leader
- A producer of generic or commodity products
- A sub-contractor?

What era your current goals for

- Market development
- Product development

What is your analysis of the present competitive position in terms of

- Threats for the business
- Opportunities
- Competitive edge

2) Sales and Marketing

How many customers do you have?

Many Customers

- Do you make to order, make to stock or assemble to order?
- How do you distribute your goods?
- How do you approach forecasting?

Few Customers

- What sort of relationships do you have with your customers? In particular:
- How far ahead is their commitment to you?
- Do they share their plans and forecasts with you?
- Do they give you product development responsibility?
- Do they give you technical support through supplier development programmes?

Both

- Why do your customers buy from you?
- What are your current lead times to customers?

3) Design and New Product Development

What is your dependence on external support? (e.g. styling, engineering, testing etc…)

What is your average New Product Development Time?

How many new/amended products do you launch per year?

4) Plant and Equipment

What is your investment/ replacement policy?

Industry leader, "keep up with the Jones's", second hand?

What is your maintenance policy?

When investing your primary concern is excellence or process integration?

5) Quality

Which of the following techniques do you employ?

- ISO9000/BS5750
- Customer satisfaction surveys (if yes, how do you approach it?)
- Customer complaints monitoring
- Statistical Process Control
- Total Quality Management
- Cost of Quality
- Waste Minimisation
- Benchmarking

6) Purchasing and Supply

Which of the following techniques do you employ?

- Material standardisation
- Suppliers approval and monitoring
- Supplier rationalisation programme
- Long terms contracts based on win/win situations
- Forward scheduling
- Supplier education/development

7) Human Resources

Do workplace teams carry out all operations?

Do you employ continuous improvement teams, using problems solving skills and resources?

Are operators and/or teams responsible for:

- Their own quality
- Work sequencing
- Machine maintenance
- Operator task assignment
- Material issue
- Team member selection / training / discipline?

Is there a two way communication system in the enterprise?

Is there a continuous training programme?

Is there a widespread recognition of internal customer-suppliers relationships?

Is there a suggestion scheme? Is it used?

What recognition and reward systems are there in place?

Is there an appraisal system? What are its objectives?

Is management style predominantly coaching or command?

Is management structure functional or business process orientated?

8) Financial Systems, Target Setting and Performance Measurement

Are operating targets derived from Critical Success Factors, and are they consistent throughout the enterprise?

Is there a costing system capable of generating meaningful product costs?

Are targets of current performance displayed visibly, and updated often (al least weakly?)

Does the company continuously set "cost-down" targets?

Are operator involved/consulted in target setting?

9) Flexibility

Is overtime used to manage peak loading?

What use is made of sub-contracting / outworkers / temporary labour?

Is there an annualised hour scheme?

Is stock used proactively to level production?

Is there a process or a results orientation?

Appendix F: Internet Based Database Tool

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Introduction

The Internet provides the baseline for the development of distributed systems as it eliminates geographical, cultural, and industry boundaries. The Internet based database tool was developed to assist the implementation of enterprise data sharing amongst the national and transnational partners of the ADAPT-CORE project, as described in Chapter 6. The tool was designed, programmed and implemented by the author.

The database is accessible regardless of location or time through the use of a unique username and password and was developed to:

- Provide a distributed shared state (all partners can access the data)
- Enable client-side operations (all partners can use the database)
- Ensure data consistency (data is automatically inserted in the database by the partners, and accuracy is the sole responsibility of the partners)
- Ensure security (the database is accessible only through a username and password)

The database is controlled through an Internet server, capable of executing Active Server Pages scripts, and is accessed through ODBC via the ActiveX Data Objects (ADO) layer of the server. Figure 39 displays how the database is accessed through the Internet.

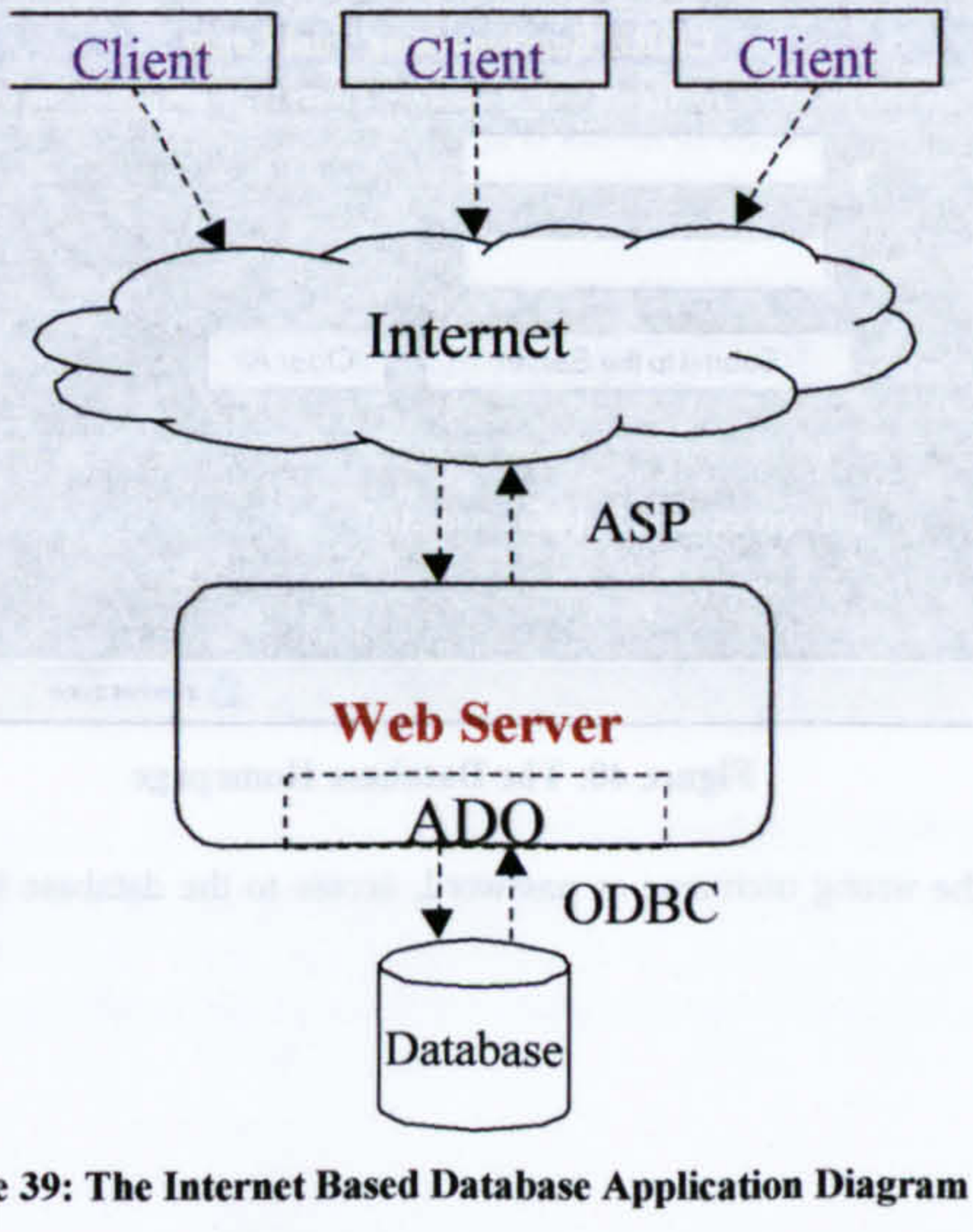

Figure 39: The Internet Based Database Application Diagram

The Internet (web) server handles incoming requests for data from the end user, through files containing Active Server Pages (ASP) scripts. If the ASP code is related to accessing or retrieving database data, then the Internet server will dispatch those calls to the database connectivity components. The connection from the Internet to the database, is conducted via the ActiveX Data Objects (ADO) layer, through the ODBC32 engine.

System Requirements

The following components are required to establish the Internet based database.:

- An Internet browser that is employed to accesses the database
- The Microsoft Internet Information Server (http server) that handles the client requests. The server must be ASP compatible.
- The Microsoft ODBC Access driver that will provide the link between the database and the server through the ADO layer.
- The Microsoft Access database which will hold the information.

Description of the Internet Based Operations

The client can access the Internet database through the use of a username and password, through the Benchmarking homepage as shown in Figure 40.

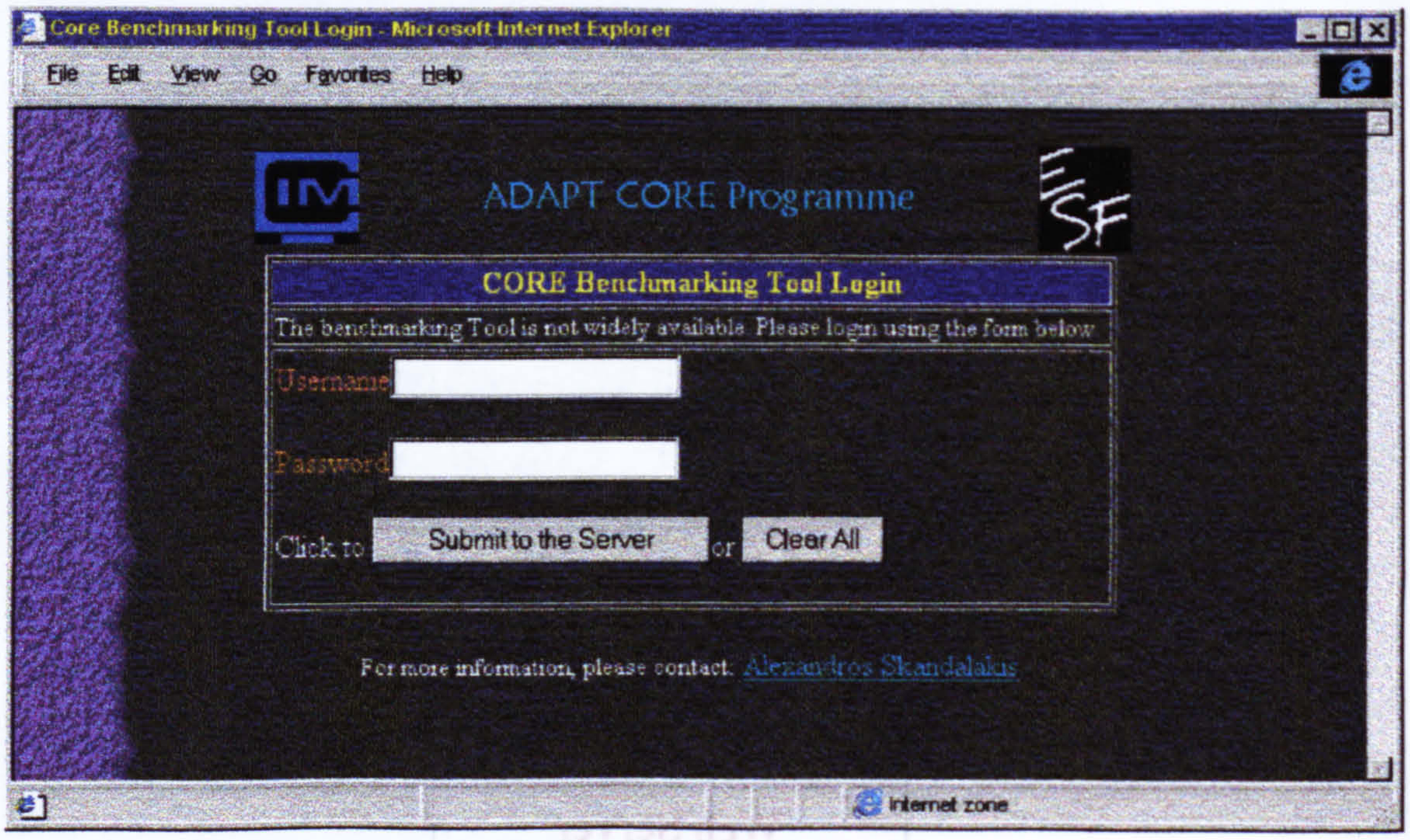

Figure 40: The Database Homepage

If the user keys in the wrong username or password, access to the database is forbidden, as shown in Figure 41.

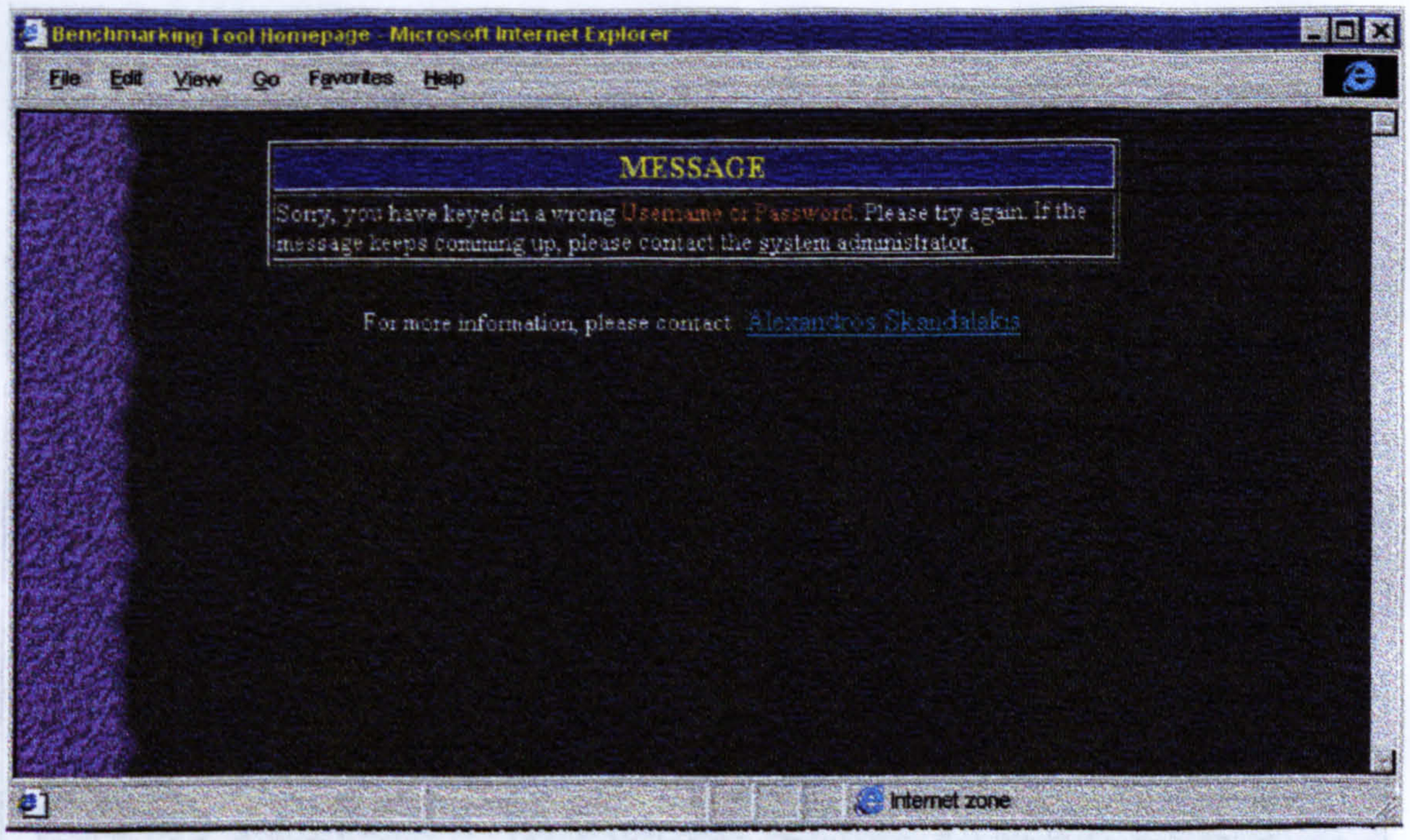

Figure 41: Access is Forbidden upon Unsuccessful Login

Upon verification of the user details (username and password), which are held in an Access database, the user is prompted with the main database page which incorporates the seven principal database operations, outlined in Chapter 6. The main database operations page is shown in Figure 42.

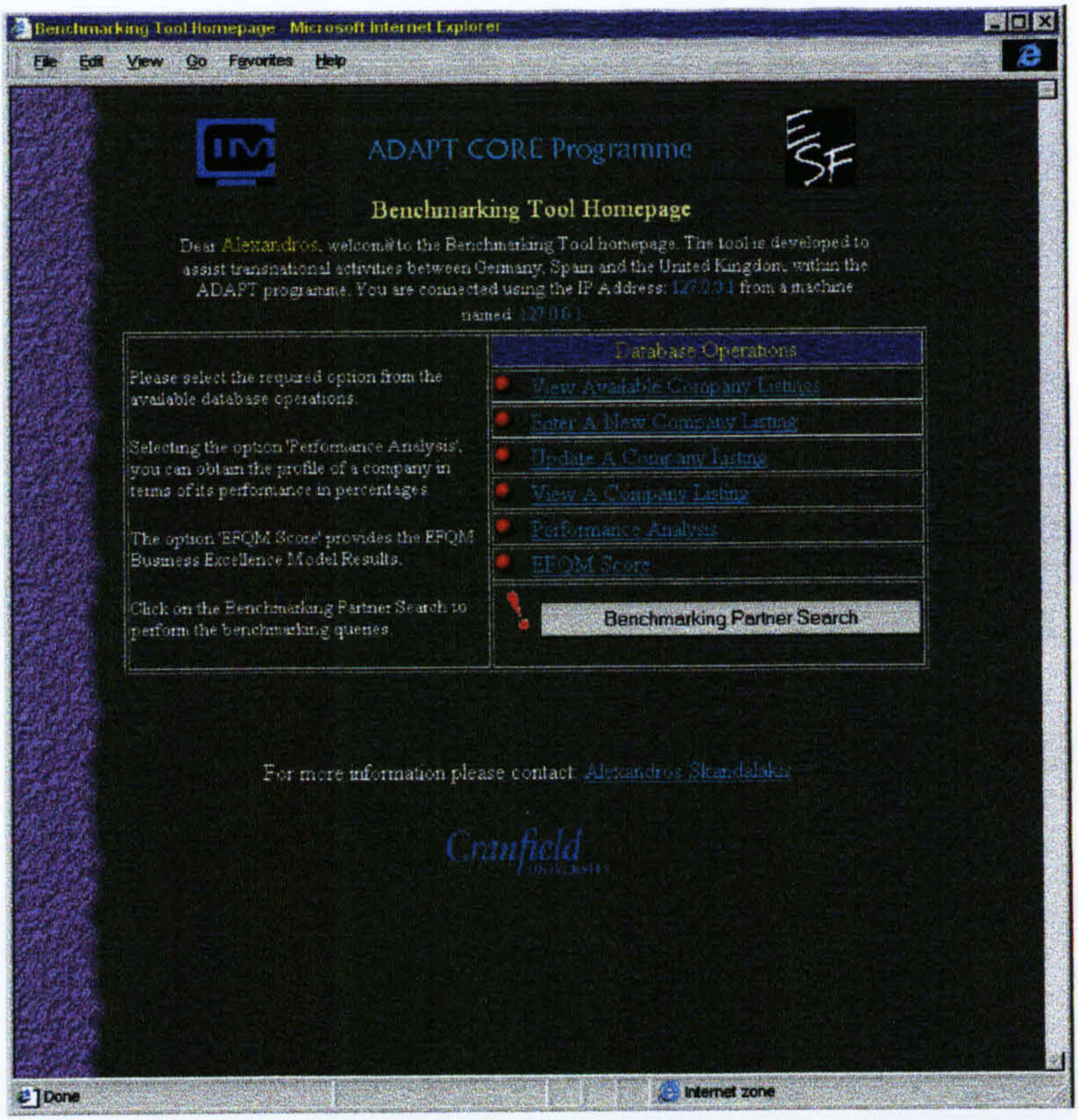

Figure 42: Database Operations Page

Operation "View Available Company Listings"

The first option listed as "View Available Company Listings" is employed to perform certain predefined queries in the database, and namely to identify companies under an industrial classification, or a geographical location, or list all enterprises held in the database. The possible queries are shown in Figure 43.

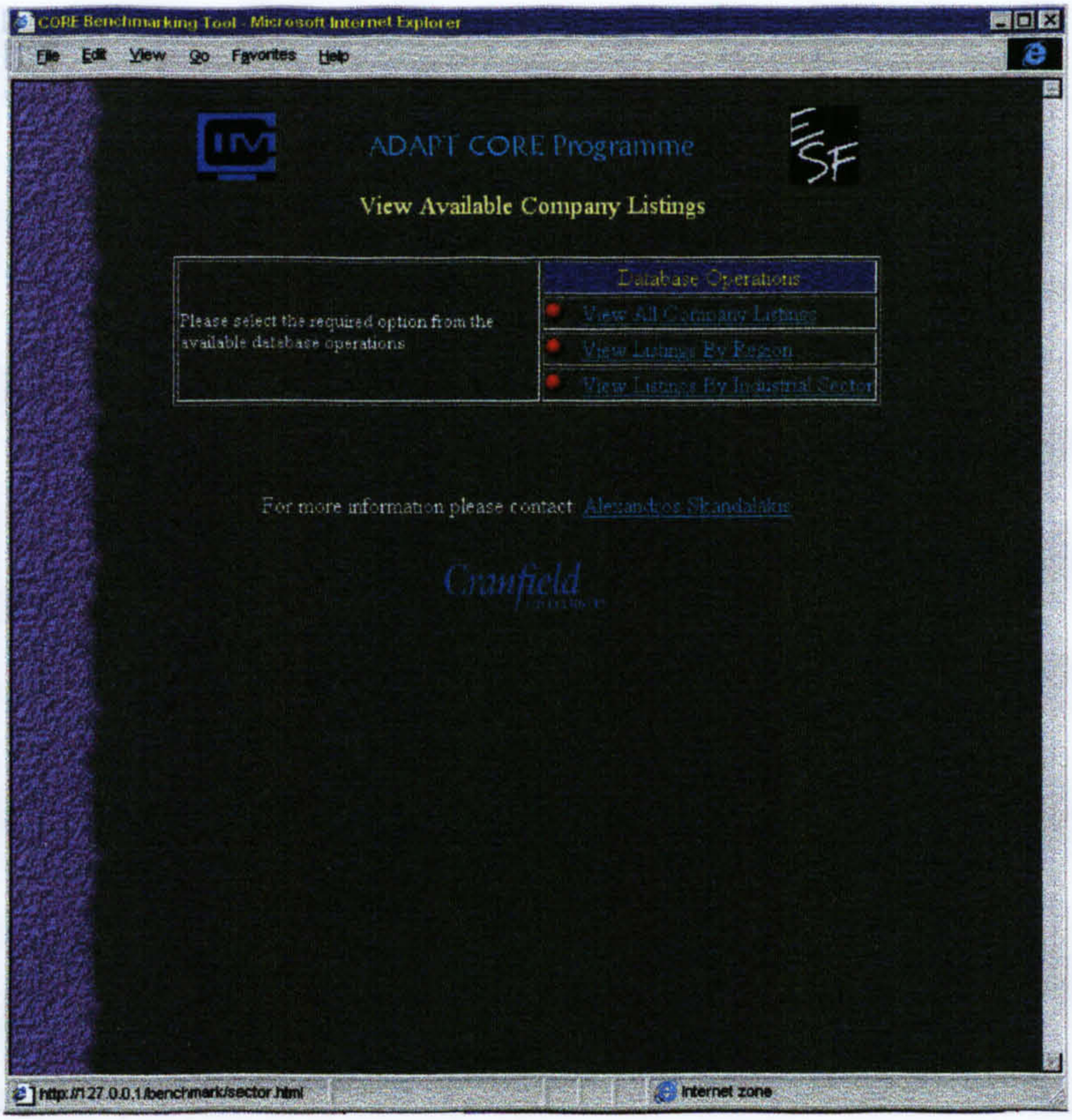

Figure 43: General Database Queries

Through the "View Available Company Listings" database operations, the user can list all enterprises satisfying a preferred criterion. For example, by selecting "View Listings by Region", the user is prompted to select the preferred region, as shown in Figure 44.

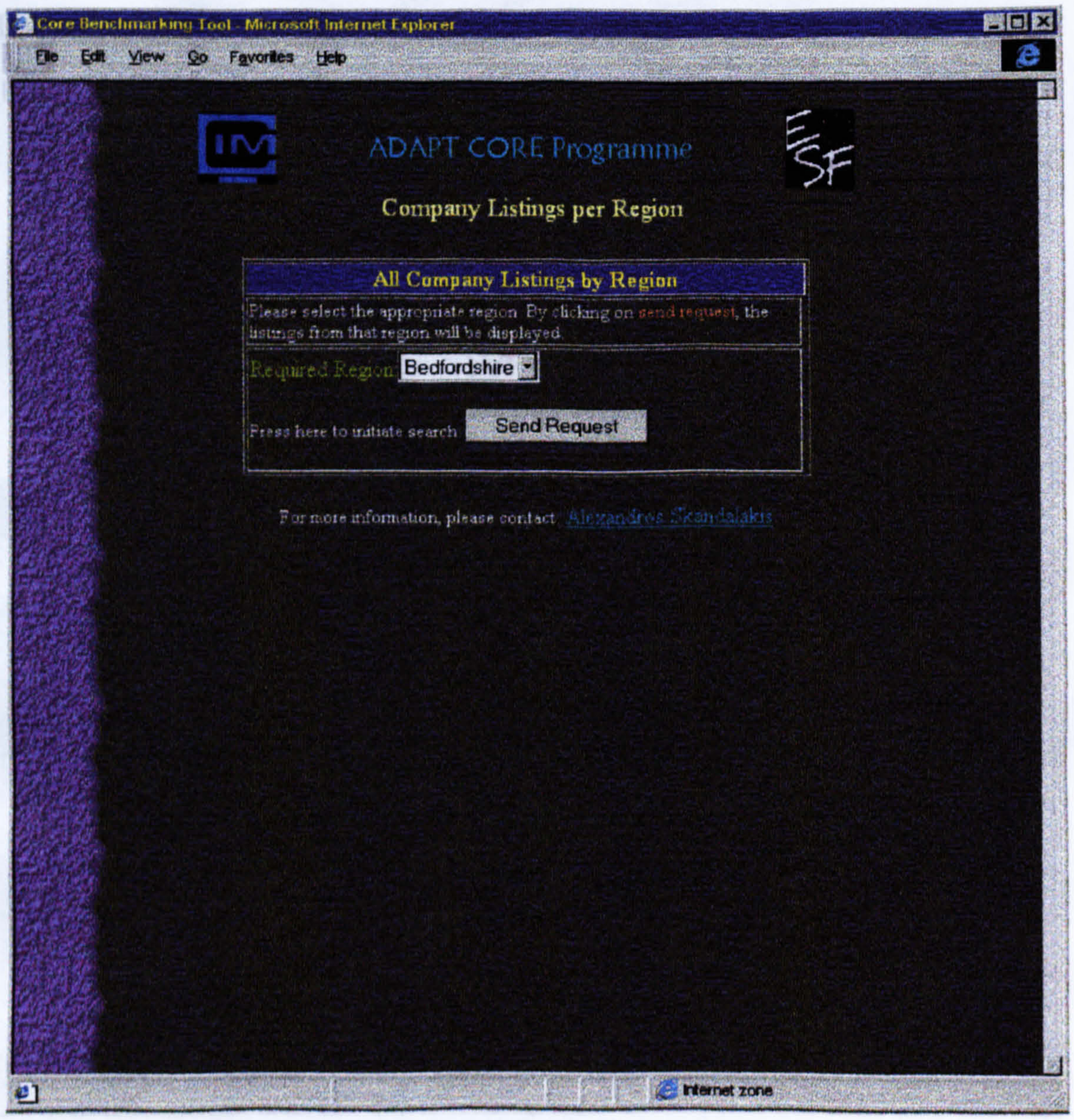

Figure 44: Selection of Preferred Region

Upon selection of the preferred region (in this case Bedfordshire), the database is queried through the "Send Request" button, and the results are shown in a table format, incorporating the enterprise name, the geographical region where the enterprise is located, its industrial classification and finally the number of employees. This was done to provide some background information about each enterprise to the user. The results of the query are shown in Figure 45.

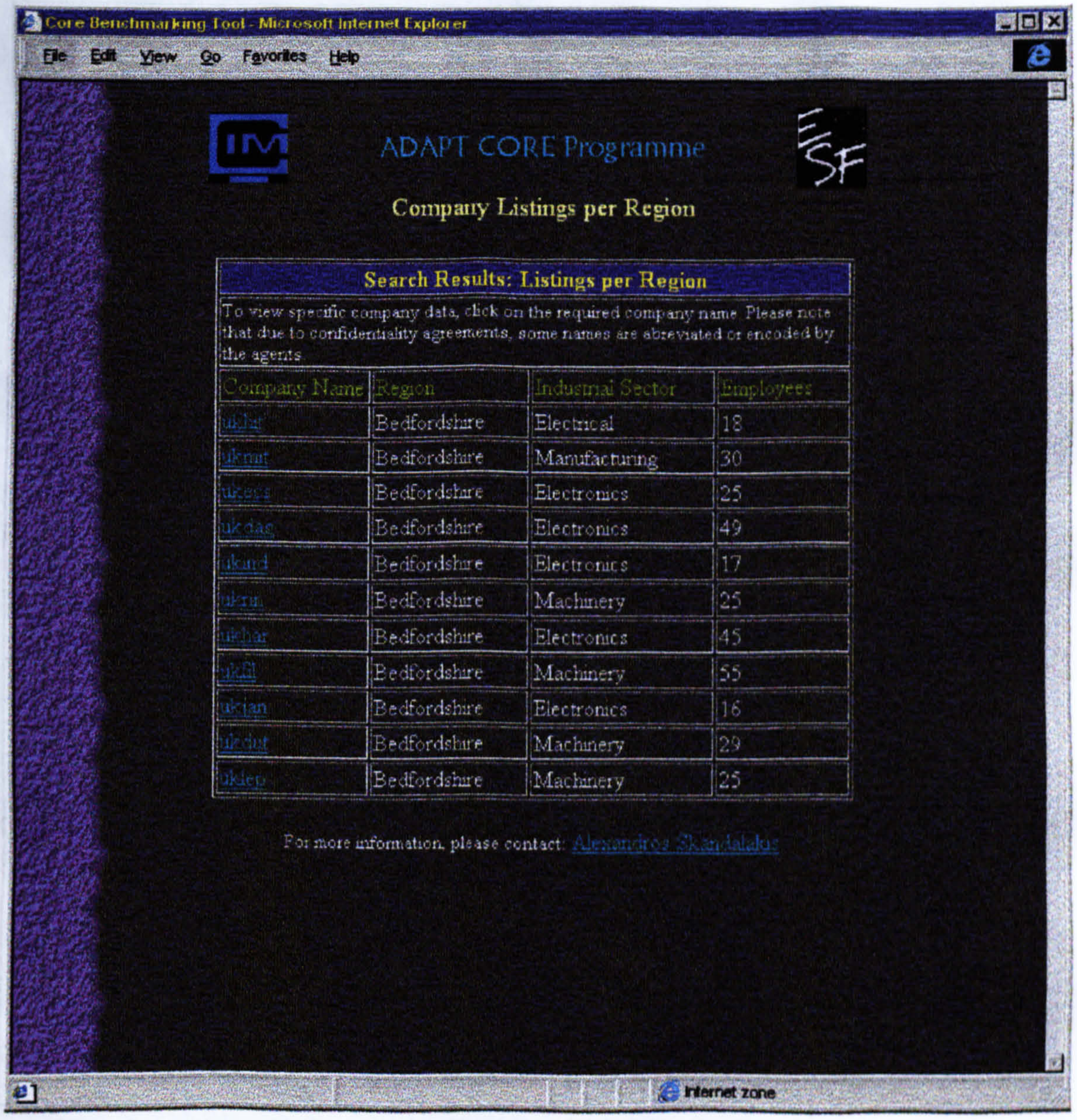

Figure 45: General Database Query Result

Operation "Enter a New Company Listing"

The second option available to the user is "Enter a New Company Listing". Through this operation the user can submit enterprise details to the database, as shown in Figure 46. Note that the end user is required to key in a "company password", only known to him, which is only requested when changing any enterprise details.

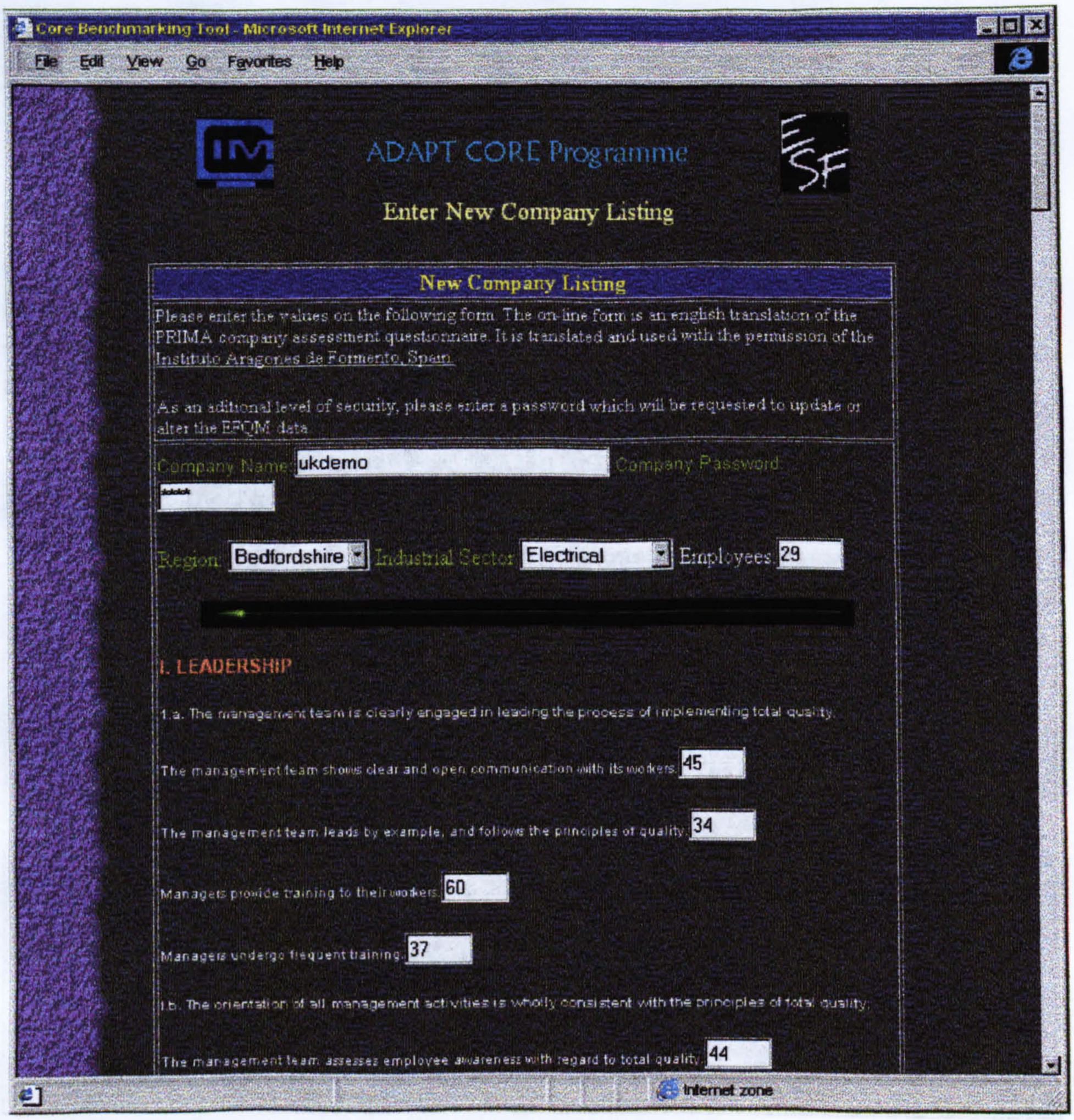

Figure 46: Enter a New Company Listing

Upon completion of the on-line form, and by selecting the "Send to Database Button" shown at the bottom of the form, the data is uploaded in the database. A confirmation is provided to the user upon successful upload, shown in Figure 47.

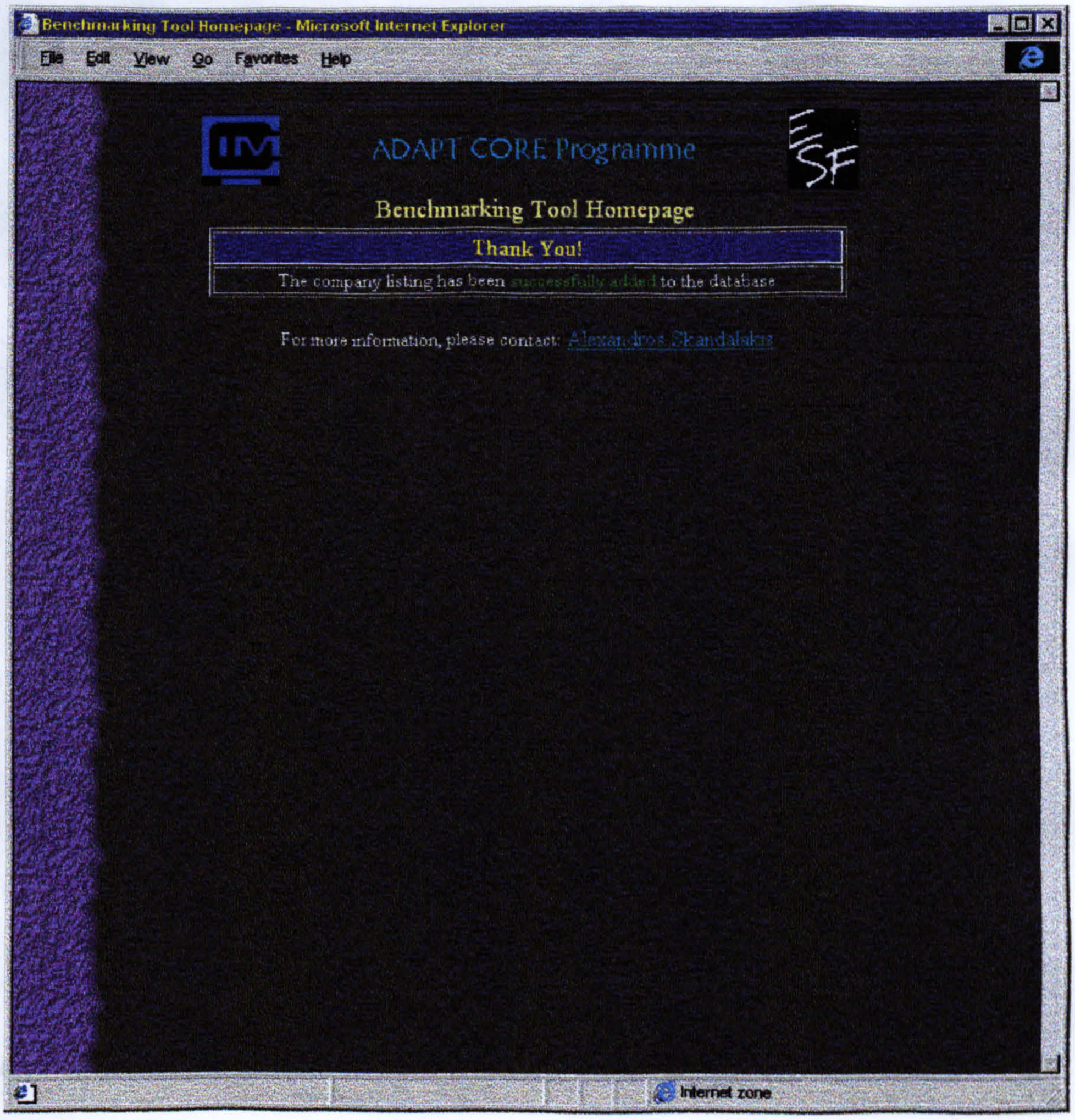

Figure 47: New Company Data Upload Confirmation

Operation "Update a Company Listing"

The third option available to the user is "Update a Company Listing", through which the user can update enterprise data which is already existent in the database. The user is required to key in the enterprise name, the predefined "company password", which he keyed in upon upload of the enterprise questionnaire, and the geographical region where the enterprise is situated, shown in Figure 48.

Figure 48: Find Company Listing for Date Updating

Upon provision of the appropriate details, the company details stored in the database are accessed, and automatically inserted in an on-line form, shown in Figure 49. The user can make any changes in any values, and select the "Send to Database Button" shown at the bottom of the form. The new data is automatically uploaded in the database, overwriting the old data. A confirmation is provided to the user upon successful upload, as in the case of the New Enterprise data upload.

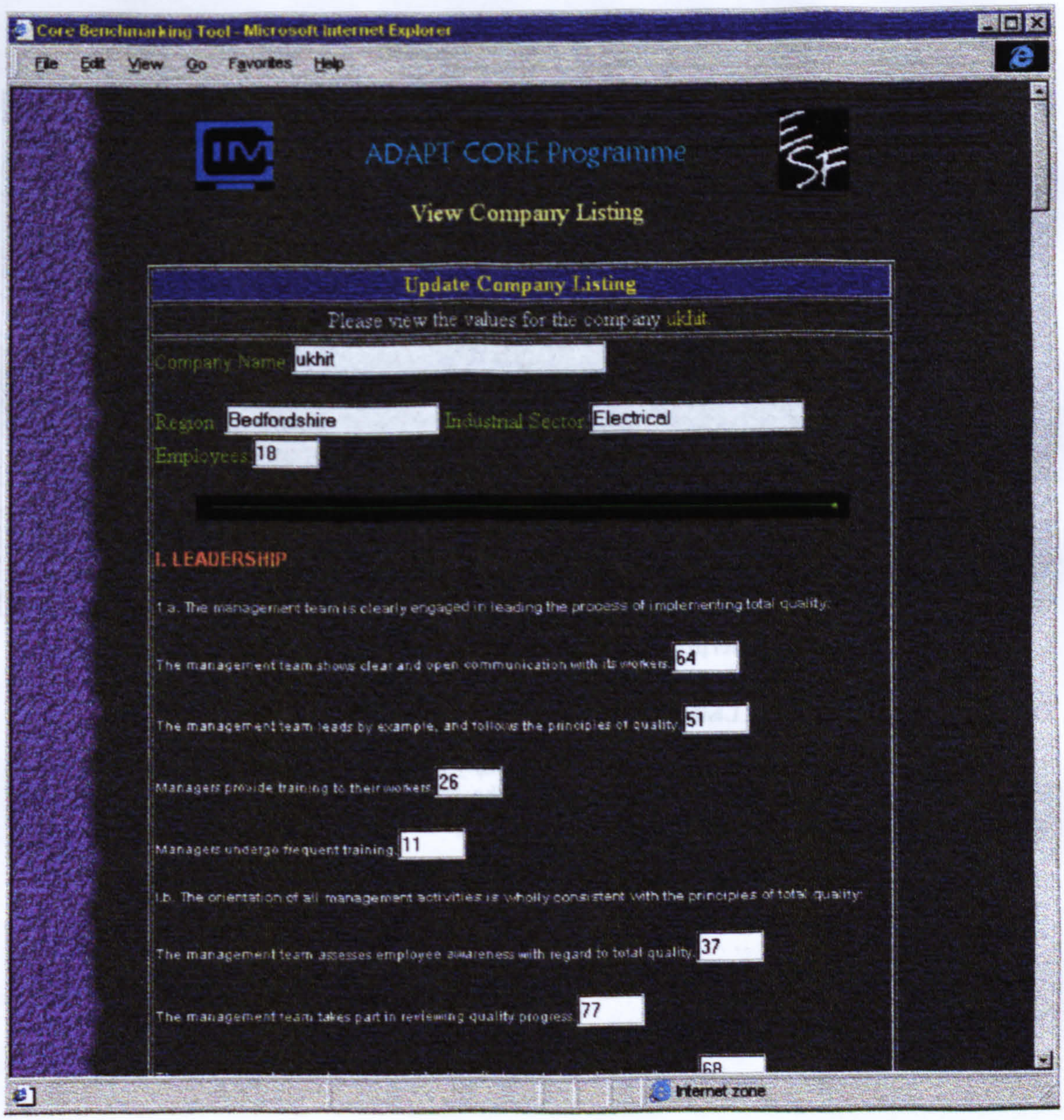

Figure 49: On-line Form to Update Existent Enterprise Data

If no company is found matching the user criteria (enterprise name, company password and geographical region), then the system returns an error message shown in Figure 50.

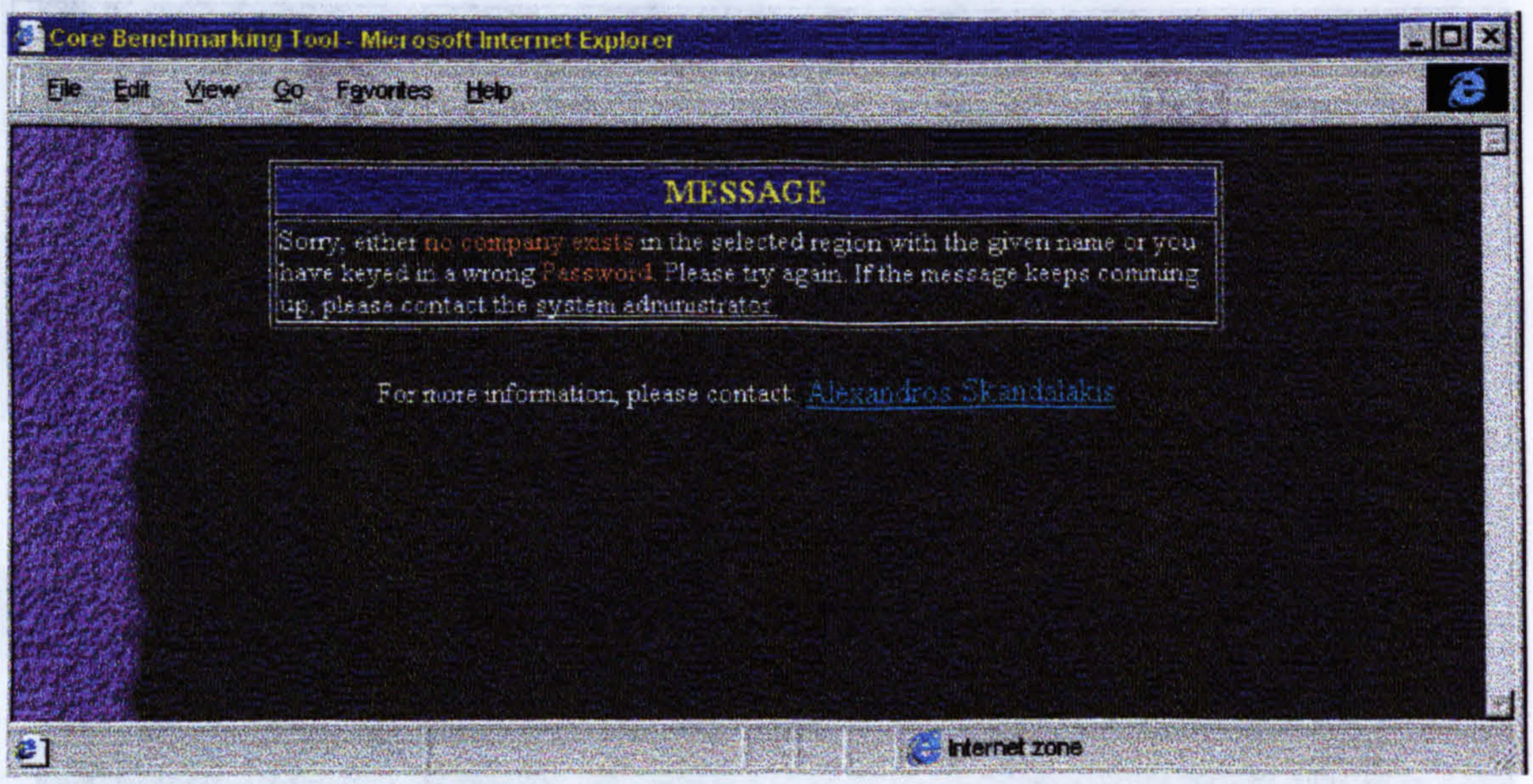

Figure 50: Enterprise Data Not Present in Database Error Message

Operation "View a Company Listing"

The fourth option available to the user is "View a Company Listing", through which the user can access and view enterprise data which is already existent in the database. The user is required to key in the enterprise name and the geographical region where the enterprise is situated, as shown in Figure 51.

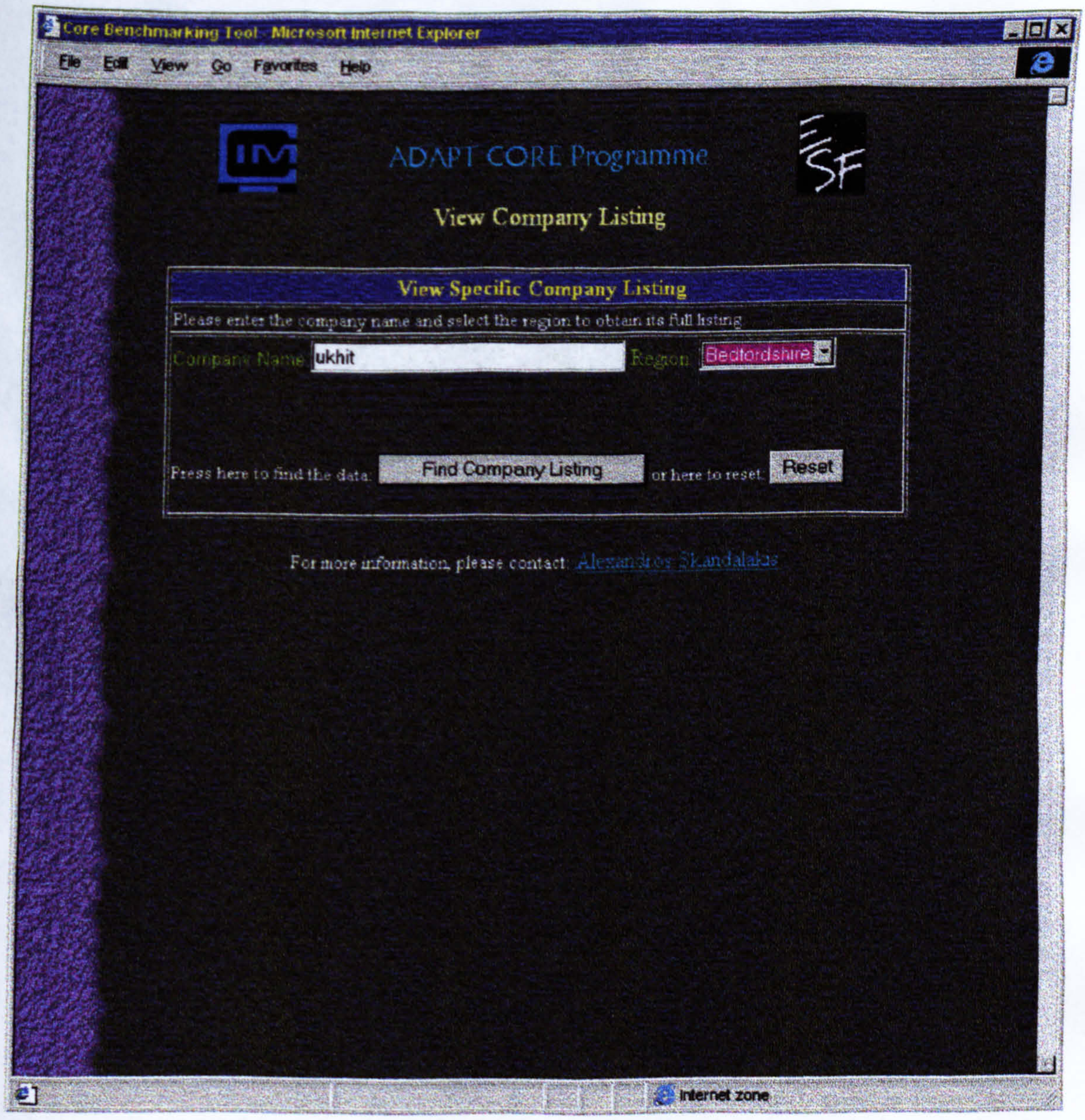

Figure 51: View Company Listing Information Request

Upon identification of the enterprise name and the appropriate geographical region, the enterprise details are shown in a on-line form which the user can print out. The data is presented in a similar form to the on-line form shown in Figure 49. If no enterprise in the database incorporates the requested name and region, then an error message is returned, shown in Figure 50.

Operation "Performance Analysis"

The fifth option available to the user is "Performance Analysis", through which the user can perform Benchmarking operations for a given enterprise. The user is requested to key in the enterprise name and geographical region, as observed in the case of the "View a Company Listing" operation and upon selecting the "Find Company Listing" button is provided with a Benchmarking analysis, as shown in Figure 52.

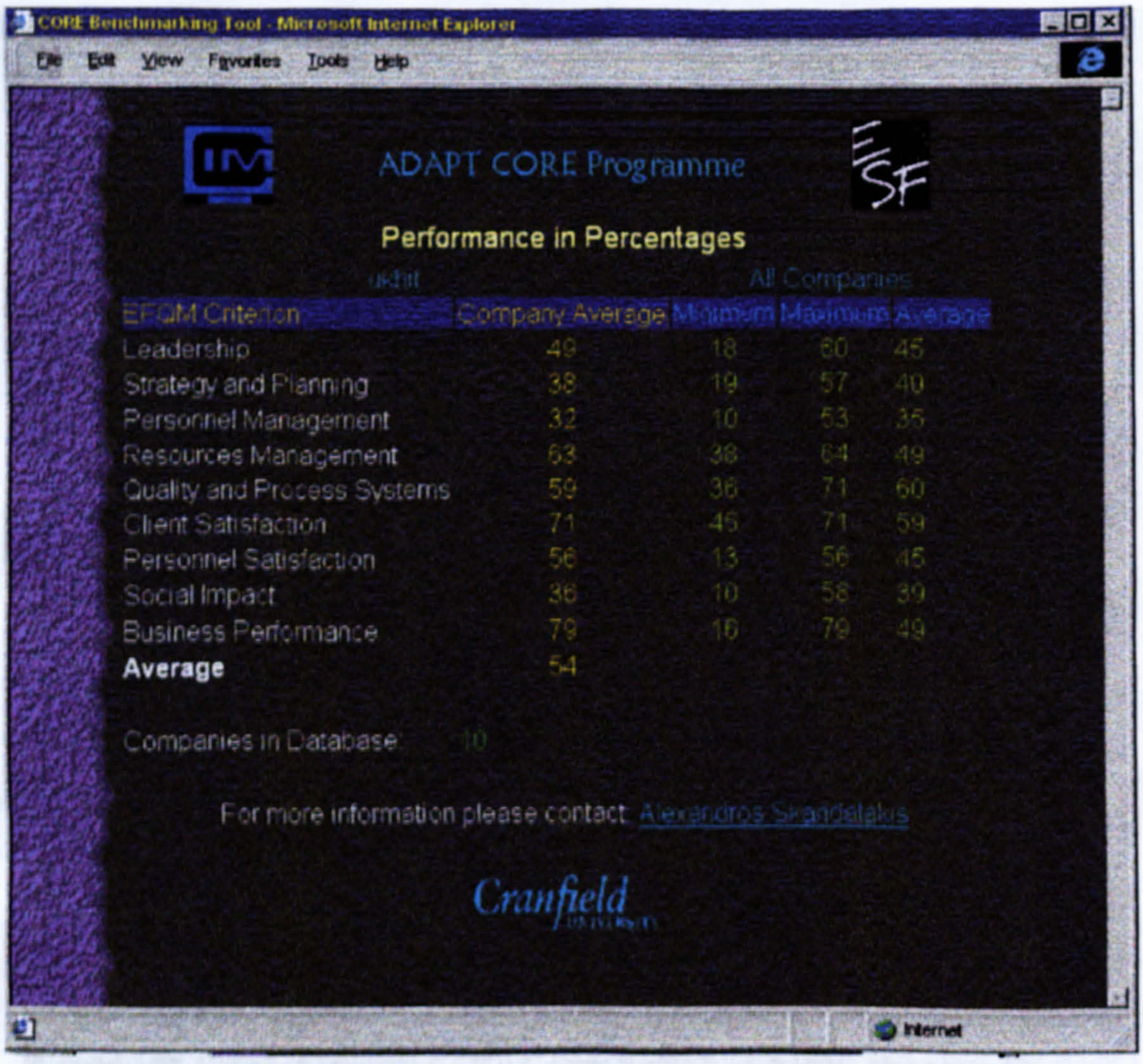

Figure 52: Benchmarking Analysis

The output lists the enterprise name (in this case "Ukhit"), and its performance for every element of the EFQM model in terms of percentage score, shown under the Company Average Score Column. The enterprise score is then compared against all enterprises in the database, through the calculation of the minimum and average values across all companies. This operation is employed to position a given enterprise performance score against other enterprises in the database.

As in the previous case, if no enterprise incorporates the requested enterprise name and geographical region, an error message is returned as shown in Figure 50.

Operation "EFQM Score"

The sixth option available to the user is named "EFQM Score", through which the user can identify the EFQM score for a given enterprise, based on the European Foundation for Quality Management Business Excellence Model. The user is requested to key in the enterprise name and geographical region, and upon selecting the "Find Company Listing" button, the EFQM score is displayed for every element of the model, as shown in Figure 53.

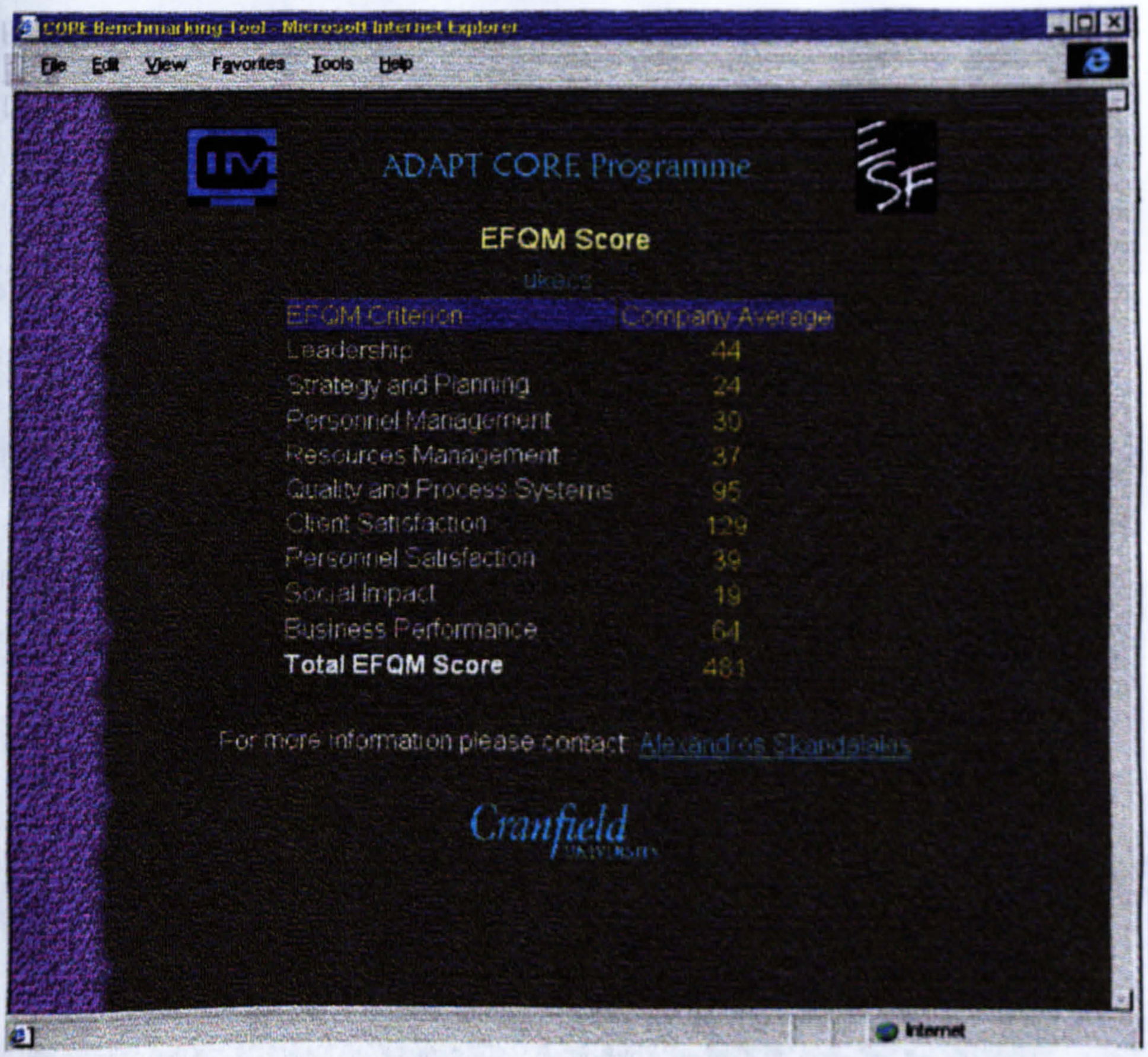

Figure 53: EFQM Score

The output lists the enterprise name (in this case "Ukhit"), the EFQM weighted score for every element of the EFQM model, and the total score of the enterprise. As in the previous enterprise specific database queries, if no data is stored the requested enterprise name and geographical region, an error message is returned to the user as shown in Figure 50.

Operation "Benchmarking Partner Search"

The final option available to the user is named "Benchmarking Partner Search". As mentioned in Chapter 6, This option is employed to find potential Benchmarking partners. It provides the option to select partners which can engage in one-to-one Knowledge Transfer and learn from each others strengths. This option introduces the concept of "Win-Win Benchmarking", where both participant companies learn from each others better practices, thus enabling bi-directional Knowledge Transfer between them. For example, in Figure 54, the user defined that the required criteria for Win-Win Benchmarking were the "Leadership" and "Business Results" (shown as Business Performance), and companies should have a difference in percent greater than 20%.

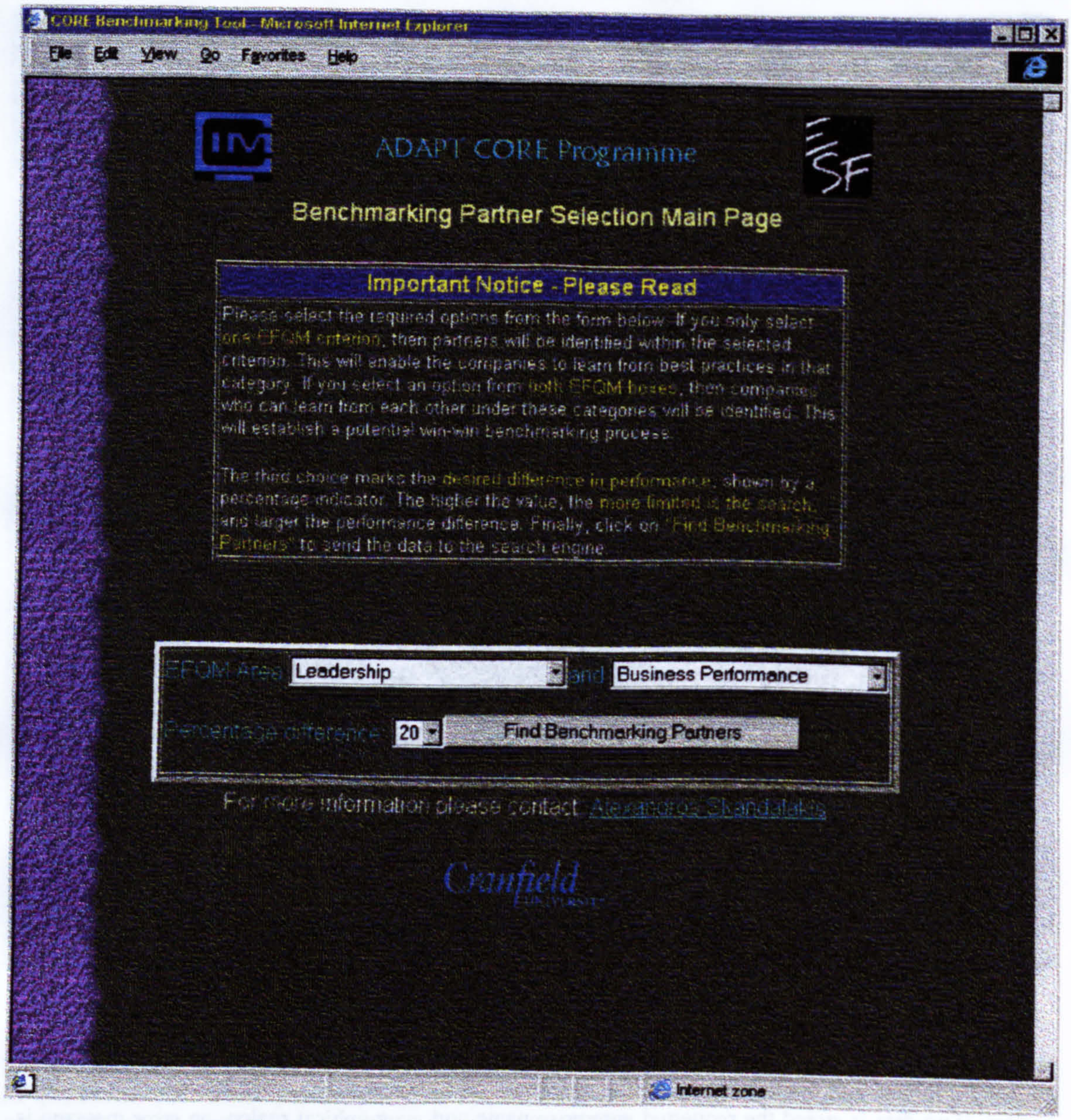

Figure 54: Win-Win Benchmarking Partner Selection

Upon selection of the "Find Benchmarking Partners" button, the database is accessed to find enterprises, which can learn from each other in the EFQM model elements of Leadership and Business Results (noted as Business Performance). A performance gap greater than 20% was selected for both cases, and the results are shown in Figure 55.

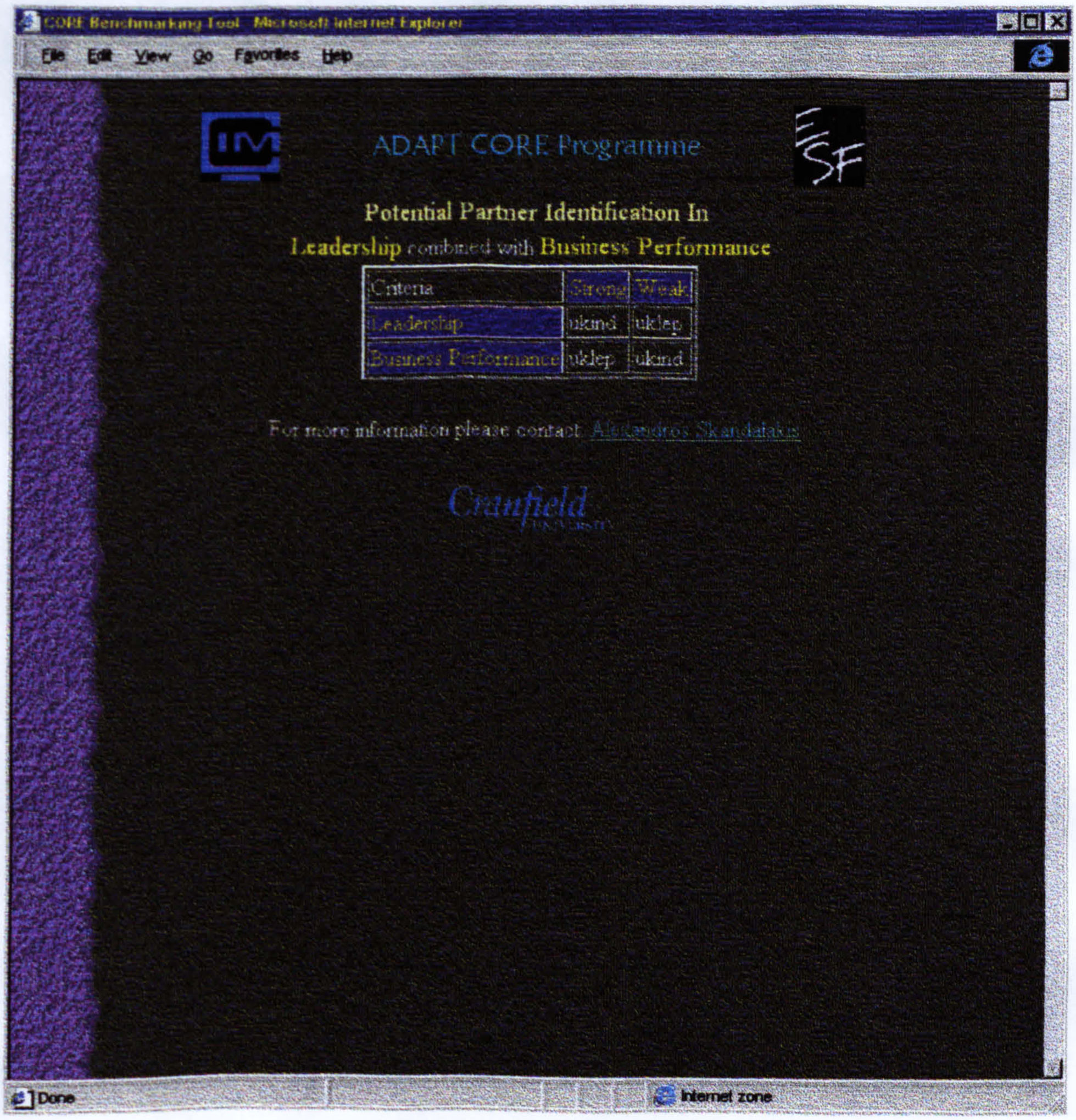

Figure 55: Win-Win Benchmarking Results

The analysis indicated that the enterprise named "Ukind" is at least 20% better than "Uklep" in the Leadership criterion, while "Uklep" is 20% better in Business Results (noted as Business Performance) than "Ukind". These enterprises can both learn from each other's practices and engage into one-to-one Knowledge Transfer process. Consequently both companies are of complementary performance and can learn from each other's practices to improve their performance.

Alternatively, the user can select only one EFQM model criterion, leave the second one blank (set to "none"), and identify a performance gap limit between the enterprises. This option is employed to identify enterprises that have a performance difference greater than a specific value in a given element. For example the enterprises which have a performance gap greater than 30% in the element of "Leadership" are shown in Figure 56.

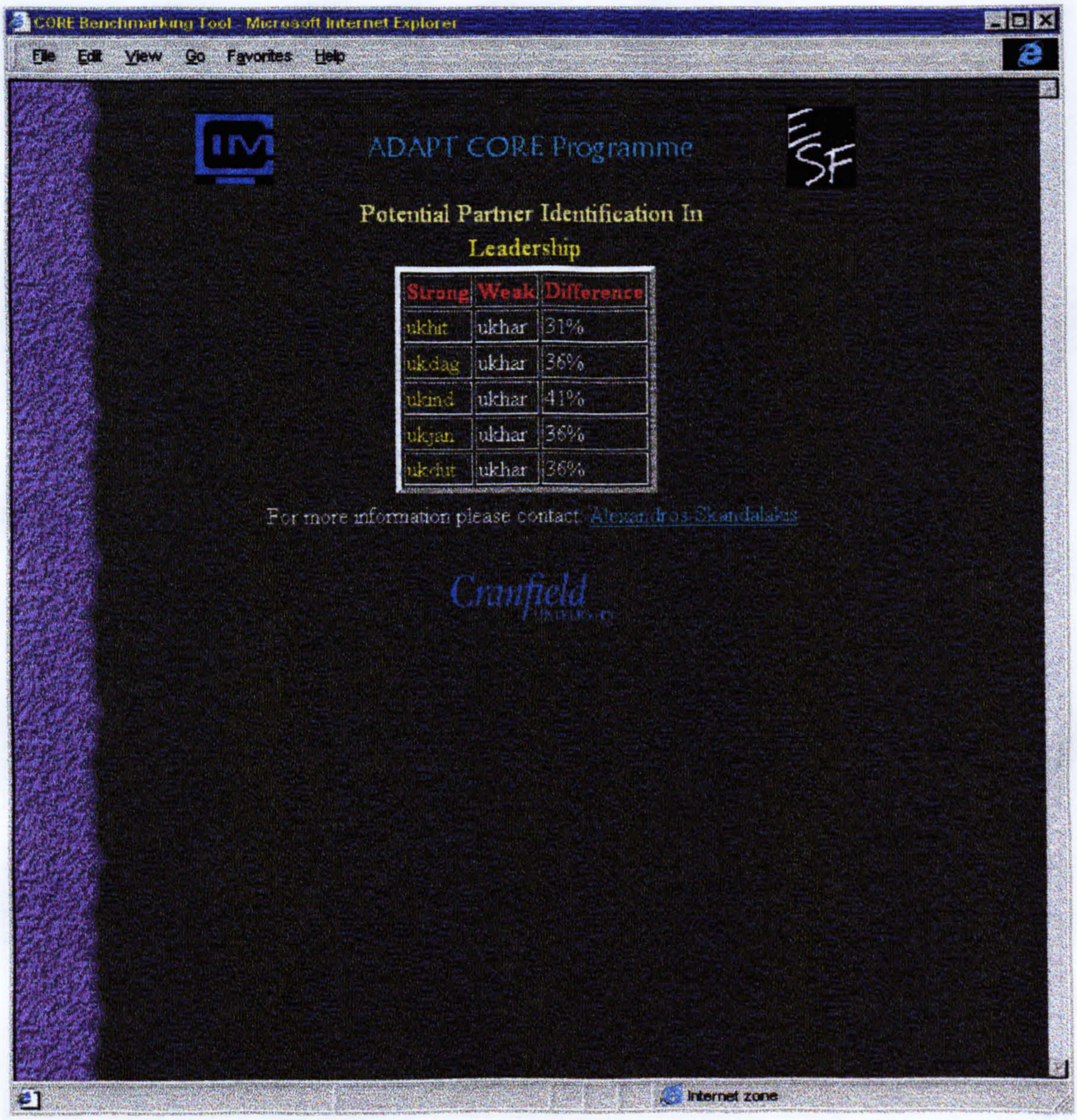

Figure 56: Potential Partner Identification

In the above example, it is shown that five enterprises have a performance difference greater than 30% from the enterprise named "Ukhar". These enterprises can assist "Ukhar" to improve its performance by establishing one-to-one partnerships for knowledge transfer.

Appendix G: Enterprise Assessment Report

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CORE

ESF

ADAPT – CORE

EFQM Assessment Report

CORE Benchmarking

Stage One: Performance Measurement

Company: NAME EXCLUDED FOR CONFIDENTIALITY REASONS

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Introduction

Benchmarking can be described as an alliance between partners to share information on practices, processes and measures that will stimulate innovative practices within a company, leading to improvement in corporate performance. As a process of finding and implementing best practices, it accelerates the rate of improvement by providing real world models and realistic improvement goals.

Small and Medium-sized Manufacturing Enterprises are often reluctant to participate in a Benchmarking study due to lack of time, scarcity of financial resources, deficiency of personnel resources, inadequacy of appropriate skills, and perplexity in selecting an appropriate partner. Those companies that benchmark often restrict their partner search to their local environs.

Benchmarking accessibility for small companies can be improved through the introduction of a company diagnostic scheme of profound significance for their sustainable development. the scheme involves a business Needs Analysis process that can provide participating companies with a fresh perspective on their strengths and weaknesses. the analysis connects to business performance, and is supplemented by a Benchmarking study to help recalibrate the company towards best practice excellence. the objective is to provide a diagnosis of company strengths and weaknesses, and to make recommendations for improvement, obtained from companies of superior performance.

Benchmarking Process

Benchmarking as an improvement tool, involves a process of continuously measuring and comparing an organisations performance against superior performance anywhere in the world, in any industrial sector, with the aim to gain knowledge on how premium performance can be attained. It is applied at the top business level, to provide information on the company profile, and subsequently identify means of how the benchmarked company can improve its performance. the emphasis is not placed on where a company is positioned on the performance chart, but provide recommendations to the managers on required actions for the company to improve its business and so move forward.

The Knowledge Transfer Process

The first step incorporates the Performance Measurement system. the objective is to collect data within the company, preferably in qualitative and quantitative formats, horizontally and vertically within the organisation. This is a critical step, which provides the profile of the company, identifies communication problems within the company and provides an understanding of the strengths and weaknesses of the business. the second stage involves mapping the profile of the company on a performance grid, with the aim to position the company against external practices, and identifies better practising companies. the third stage incorporates Knowledge Transfer from the better practices. This stage provides a direct comparison of the performance of the company with that better performing enterprises to obtain recommendations about better practices leading to improvements in the business process.

Percentage Score Key

Percentage	Description
0% - 20%	Anecdotal situation - nothing or very little done.
21% - 40%	Some ideas, which are being acted upon to some extent. Little practical effect.
41% - 60%	there is some evidence of the criteria being satisfied. Reviews are not very systematised.
61% - 80%	Well-grounded methodologies based on forward planning, with periodic reviews in response to data. Not all areas of the company are covered.
81% - 100%	All criteria are satisfied, with very solid management methodologies that are periodically reviewed.

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CORE

SECTION A

Data Collected

	LEADERSHIP	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Average
1.a.	the management team is clearly engaged in leading the process of implementing total quality:															
	the management team shows clear and open communication with its workers.	50	30	30	50	50	70		30	30	70	30	30	10	50	41
	the management team leads by example, and follows the principles of quality.	30	50	50	50	50	70	70	30	50	70	10	30	30	50	46
	Managers provide training to their workers.	50	70	50	70	30	90	70	10	70	70	10	10	50	50	50
	Managers undergo frequent training.	50	50	50	70	70	90	90	10	70	90	10	10	70	50	56
I.b.	the orientation of all management activities is wholly consistent with the principles of total quality (client satisfaction, management based on facts other than intuition, continuous improvement, involvement of all personnel, active leadership)															
	the management team assesses employee awareness with regard to total quality.	50	50	70	70	70	70	70	70	70	50	50	50	70	70	63
	the management team takes part in reviewing quality progress.	50	70	70	70	70	70	70	70	90	50	70	50	70	70	67
	the management team always appreciates the efforts made by individuals and teams.	10	30	90	70	70	90	70	70	70	70	10	50	70	50	59
	the management team acknowledges the achievements of individuals, teams, clients and suppliers.	10	30	70	70	70	70	70	70	30	70	10	50	70	70	54
I.c.	the company's management provides active leadership towards total quality:															
	the management provides the necessary resources and support for improvement activities.	10	50	10	70	50	70	70	50	50	50	10	50	30	50	44
	the management takes initiatives to meet with clients in order to understand and satisfy their needs.	50	50	50	70	70	70	70	90	70	70	10	50	50	70	60
	the management takes initiatives to meet with suppliers in order to understand and satisfy their needs.	50	50	10	50	50	50	70	90	30	50	10	50	70	70	50
	Managers personally participate in activities designed to promote total quality outside the company.	30	50	30	70	70	70	70	90	50	50	10	50	90	70	57

	POLICY and STRATEGY	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Average
2.a.	With regard to the formulation and definition of its strategies, the company has a method for incorporating objective information:															
	the company gathers and uses information obtained from its clients (surveys, meetings, etc.).	50	50	70	50	70	50	90	90	30		30				58
	the company gathers and uses information obtained from the field (market studies, reports, etc.).	50	50	70	50	50	70	90	70	10		50				56
	the company gathers and uses information obtained from its employees (surveys, etc.).	50	50	70	50	70	50	90	70	10	50				10	52
	the company gathers and uses information obtained from it suppliers (meetings, reports, etc.).	50	50	10	50	50	50	90	70	30		10				46
2.b.	Annual plans and objectives are closely linked to company strategy:															
	the company involves its personnel in the implementation of realistic plans and objectives.	50	30	70	70	90	50	90	90	30	30				30	57
	the overall objectives of the company form the basis for defining departmental and individual objectives.	50	30	30	70	70	50	70	50	30	50	70			30	50
	the company establishes adequate plans and objectives which are coherent with its strategy.	50	50	30	70	70	50	50	50	50	50	70			30	52
	the company has a good method for reviewing the efficacy of its plans and strategies, and for correcting these when they fail to produce the desired results.	50	30	50	70	70	70	50	30	50	50				30	50
2.c.	the company communicates its plans to all interested parties:															
	the company communicates its plans and objectives to all personnel.	30	30	90	70	70	70	70	30	10	70	70	30		50	53
	All employees understand their objectives.	30	30	30	50	90	90	70	50	30	70	30	30		50	50
	the company ensures that clients and suppliers are kept informed of any significant changes to its overall plans.	50	30	30	50	70	70	70	30	30		10	30			43

	PEOPLE MANAGEMENT	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Average
3.a.	the company formulates plans for its personnel:															
	the method used for planning personnel management is periodically reviewed.	50	50	10	70	70	70	70		10	70	10				48
	Recruitment plans are used; the efficacy of these is reviewed, and improvements are incorporated systematically.	50	30	10	70	50	70	70	70	10		30				46
	Training plans are used; the efficacy of these is reviewed, and improvements are incorporated systematically.	50	50	50	70	50	90	70	50	70	70	30			50	58
	Promotion plans are used; the efficacy of these is reviewed, and improvements are incorporated systematically.	50	70	10	70	50	90	70	30	70	50	50				55
	the company agrees and reviews objectives with individuals and teams.	50	30	50	70	70	90	70	70	70	50	30				59
	the company assesses individual performance.	50	50		50	50	90	70	90	90	50	10			90	63
3.b.	the company ensures the involvement and participation of its employees.															
	the company facilitates participation by all employees in the continual improvement of products, services and processes, and in the taking of decisions and initiatives.	10	30	30	50	70	70	50	90	10	50	10			70	45
	the company encourages its personnel to make decisions and implement changes within clearly-agreed parameters.	30	30	50	70	70	70	50	90	70	70	30			70	58
	the method used for top-down and bottom-up communication is efficient, and is periodically reviewed in order to introduce new improvements.	10	10	50	50	70	50	70		30	50	30			50	43

	RESOURCES	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Average
4.a.	the company manages its financial resources:															
	the method used for planning and controlling the principal balance sheet elements (clients, suppliers, fixed assets, capital, indebtedness, etc.) is consistent with the company's strategy.	30	50	50	50	70	50	70		90	70	10				54
	the company distributes and utilises financial resources in a manner that supports its objectives for the future.	30	50	50	50	70	50	70		50	70	30				52
	the company adequately manages financial risks.	50	70	50	50	70	50	70	70	70	70	50				61
4.b.	the company manages its information resources:															
	the company's approach to information management ensures that all data on products, services, processes, clients, suppliers and competitors is easily accessible to and usable by interested parties.	50	30	70	50	50	50	70		30	70	30				50
	the company ensures that all employees are provided with adequate information in order to carry out their work.	30	30	30	50	90	70	70		30	50	10				46
	the company ensures the security, accessibility and accuracy of information.	10	50	30	50	70	50	70		30	70	30				46
4.c.	the company manages its material resources:															
	the company has a method which enables it continually to improve the control and efficient use of its material resources (fixed assets, buildings, equipment, etc.).	30	50	50	50	50	50	50		50	70	30				48
	the company has a method which enables it continually to improve the control and efficient use of its suppliers.	30	70	50	50	70	50	50		30	70	10				48
4.d.	the company manages the application of technology:															
	the company has a routine system for identifying, evaluating and incorporating new technologies (this also includes new computer technologies, e.g. for the management of invoicing.)	10		30	70	30	50	50		30	50	30				39
	the company manages and optimises the use of its intellectual property (in terms not only of technology, but also of the market, e.g. brands).	30		30	70	30	50	50		70						47

	PROCESSES	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Average
5.a.	the company manages its quality system:															
	the company has a method for managing its quality system, based on ISO 9000 standards. (If the certificate is not held, a few points can still be allocated).	50	90	90	70	90	50	90		90	90	10	90	90	90	76
5.b.	the company's activities are orientated towards the client:															
	the company has a system for detecting the needs of its clients, and uses the information so obtained to improve its products and services.	50	50	70	70	90	70	90	90	70	70	10	10		50	61
	the company actively fosters a close relationship with its clients.	30	50	70	70	90	50	90	90	70	70	30	90		70	67
5.c.	the processes of manufacturing, or of supplying services, are managed systematically:															
	Processes are supervised by a designated responsible person or owner.	50	50	50	70	70	50	90	90	90	90	30	50		90	67
	there are defined standards for processes.	70	50	50	70	70	50	90	90	90	90	30	50		90	68
	Products or services are improved in response to client requirements.	50	50	70	70	90	50	90	90	90	70	50	90		90	73
	the company ensures regular delivery of its products or services in accordance with the requirements of its clients.	30	70	90		90	50	90	90	90	70	10	90		70	70
5.d.	the company manages the process of continual improvement:															
	the company identifies its key processes.	50		70	70	90	50	70	70	70	70	10	50		70	62
	the company establishes monitoring indicators, and sets objectives.	50	70	70	70	50	50	70		90	50	10	50		70	58
	the company uses a consistent method for introducing changes.	50	30	50	70	70	70	70		50	70	10	50		70	55

	CUSTOMER SATISFACTION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Average
6.a.	the company uses direct tools (e.g. surveys) to measure clients satisfaction with its products or services:															
	the company measures the satisfaction of its clients.	50	50	10	50	90	70	70	90	70		10			30	54
6.b.	the results of these measurements show a positive trend over the last 3-5 years in terms of:															
	the company's ability to comply with product or service specifications.	10	50	30	50	90	70	70		50	70	10				50
	the reliability of products or services.	50	50	50	70	90	70	70		70	50	30				60
	the punctuality of deliveries.	30	70	50	70	90	70	70		50	50	30				58
	Responsiveness.	30	70	30	70	90	70	70		70	70	50				62
	the processing of complaints.	50	50	50	70	90	70	70		70	50	30				60
	the operation of its technical service.	50	50	50	70	70	70	90		50	70	30				60
	the implementation of guarantees.	50	50		70	70	70	90		70	90	30				66
6.c.	the company achieves good indirect results which suggest that clients are satisfied:															
	the company has a low complaint rate.	50	50	70	50	70	50	90		70	70	10		70		59
	Clients send large numbers of greetings cards, rewards, or "good supplier" certificates.	30	50	10	70	50	30	70	50	70	70	10				46
	the company receives progressively larger orders from its regular clients.	30	50		70	50	70	50	90		70	10		70		56

	PEOPLE SATISFACTION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Average
7.a.	the company uses direct tools (e.g. surveys) to measure the satisfaction of its employees:															
	the company measures the satisfaction of its employees.	30	30	30	50	50	70	70	50	10	50	30			10	40
7.b.	the results of these measurements show a positive trend over the last 3-5 years in terms of:															
	Satisfaction with the working environment.	10	50	50	50	50	70	70		30	30	10			30	41
	Health and safety provisions.	50	50	50	50	50	70	30		30	30	30			50	45
	Internal communication systems.	50	50	30	50	70	70	70		70	30	10			50	50
	Compensation and examination systems.	50	30	30	50	70	70	70		30	30	10			50	45
	Profit-sharing systems.	70	70	70	50	90	90	70		70	70	10			70	66
	the style of management.	10	50	50	50	70	90	70			70	10			50	52
	Ongoing training.	50	70	70	50	70	90	70		70	90	30			70	66
7.c.	the company achieves good indirect results which suggest that employees are satisfied (low rates of absenteeism, staff turnover, accidents, etc.):															
	the company shows low rates of absenteeism.	70	50	70	90	70	90	70	90	90	70	30			70	72
	there is a very low rate of staff turnover.	10	50	30	70	30	70	50			70	10			70	46
	the accident rate, and the seriousness of the accidents involved, is progressively lower.	70	90	70	90	70	90	90	90		90	30			70	77

	IMPACT on SOCIETY	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Average
8.a.	the perceptions of the local community with regard to the company's activities:															
	the company is familiar with the perceptions of the local community with regard to its activities.		30	50	30	70	50	70	10	10		30			10	36
	the company actively involves itself in various cultural, sporting, social and environmental initiatives.		10	10	30	10	30	10	10	10		10			10	14
8.b.	the company is committed to environmental management:															
	the company takes initiatives to reduce the quantity of waste products and noise levels.	30	50	50	90	50	50	70		30	50	10			10	45
	the company takes initiatives to prevent health and safety hazards.	50	70	70	90	70	70	70		50	50	30			10	57
	the company takes initiatives to use recycled materials.	70	30	90	70	50	50	50		30	70	10			10	48
	the company takes initiatives to reduce water and power consumption.	50	50	50	70	70	70	70		10	70	30			10	50

	BUSINESS RESULTS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Average
9.a.	the economic/financial indicators show a positive long-term trend over the last 3-5 years, and compare well with the company's objectives and with its competitors:															
	Sales.	50		70	50	70	50	50								57
	Profits.	50		70	50	50	70	50								57
	Unit costs.	50		70	50	50	70	50								57
	Financial costs.	50		70	50	70	70	50								60
	Dividends.	50		50	50	50	50	50								50
9.b.	the indicators of non-financial management (e.g. market share, defect rates, cycle times for principal processes) show a positive long-term trend over the last 3-5 years, and compare well with the company's objectives and with its competitors:															
	Market share.	30		30	50	70	50	50								47
	Defect rates.	50		50	50	70	50	50								53
	Product development times.	50		30	50	70	50	50								50
	Order response times.	50		50	50	70	50	50								53

SECTION B

Deviation from Average

	LEADERSHIP	1	2	3	4	5	6	7	8	9	10	11	12	13	14
I.a.	the management team is clearly engaged in leading the process of implementing total quality:														
	the management team shows clear and open communication with its workers.	9	11	11	9	9	29		11	11	29	11	11	31	9
	the management team leads by example, and follows the principles of quality.	16	4	4	4	4	24	24	16	4	24	36	16	16	4
	Managers provide training to their workers.	-	20	-	20	-20	40	20	- 40	20	20	- 40	- 40	-	-
	Managers undergo frequent training.	-6	-6	-6	14	14	34	34	- 46	14	34	- 46	- 46	14	-6
I.b.	the orientation of all management activities is wholly consistent with the principles of total quality (client satisfaction, management based on facts other than intuition, continuous improvement, involvement of all personnel, active leadership)														
	the management team assesses employee awareness with regard to total quality.	13	13	7	7	7	7	7	7	7	13	13	13	7	7
	the management team takes part in reviewing quality progress.	17	3	3	3	3	3	3	3	23	17	3	17	3	3
	the management team always appreciates the efforts made by individuals and teams.	- 49	29	31	11	11	31	11	11	11	11	- 49	-9	11	-9
	the management team acknowledges the achievements of individuals, teams, clients and suppliers.	- 44	24	16	16	16	16	16	16	24	16	- 44	-4	16	16
I.c.	the company's management provides active leadership towards total quality:														
	the management provides the necessary resources and support for improvement activities.	34	6	34	26	6	26	26	6	6	6	34	6	14	6
	the management takes initiatives to meet with clients in order to understand and satisfy their needs.	-10	-10	-10	10	10	10	10	30	10	10	- 50	-10	-10	10
	the management takes initiatives to meet with suppliers in order to understand and satisfy their needs.	-	-	- 40	-	-	-	20	40	-20	-	- 40	-	20	20
	Managers personally participate in activities designed to promote total quality outside the company.	27	-7	27	13	13	13	13	33	-7	-7	47	-7	33	13

	POLICY and STRATEGY	1	2	3	4	5	6	7	8	9	10	11	12	13	14
2.a.	With regard to the formulation and definition of its strategies, the company has a method for incorporating objective information:														
	the company gathers and uses information obtained from its clients (surveys, meetings, etc.).	-8	-8	12	-8	12	-8	32	32	28		28			
	the company gathers and uses information obtained from the field (market studies, reports, etc.).	-6	-6	14	-6	-6	14	34	14	- 46		-6			
	the company gathers and uses information obtained from its employees (surveys, etc.).	-2	-2	18	-2	18	-2	38	18	42	-2				- 42
	the company gathers and uses information obtained from it suppliers (meetings, reports, etc.).	4	4	36	4	4	4	44	24	16		36			
2.b.	Annual plans and objectives are closely linked to company strategy:														
	the company involves its personnel in the implementation of realistic plans and objectives.	-7	27	13	13	33	-7	33	33	27	27				27
	the overall objectives of the company form the basis for defining departmental and individual objectives.	-	-20	-20	20	20	-	20	-	-20	-	20			-20
	the company establishes adequate plans and objectives which are coherent with its strategy.	-2	-2	22	18	18	-2	-2	-2	-2	-2	18			22
	the company has a good method for reviewing the efficacy of its plans and strategies, and for correcting these when failing to produce desired results.	-	-20	-	20	20	20	-	-20	-	-				-20
2.c.	the company communicates its plans to all interested parties:														
	the company communicates its plans and objectives to all personnel.	23	23	37	17	17	17	17	23	- 43	17	17	23		-3
	All employees understand their objectives.	-20	-20	-20	-	40	40	20	-	-20	20	-20	-20		-
	the company ensures that clients and suppliers are kept informed of any significant changes to its overall plans.	7	13	13	7	27	27	27	13	13		33	13		

	PEOPLE MANAGEMENT	1	2	3	4	5	6	7	8	9	10	11	12	13	14
3.a.	the company formulates plans for its personnel:														
	the method used for planning personnel management is periodically reviewed.	2	2	38	22	22	22	22		38	22	38			
	Recruitment plans are used; the efficacy of these is reviewed, and improvements are incorporated systematically.	4	16	36	24	4	24	24	24	36		16			
	Training plans are used; the efficacy of these is reviewed, and improvements are incorporated systematically.	-8	-8	-8	12	-8	32	12	-8	12	12	28			-8
	Promotion plans are used; the efficacy of these is reviewed, and improvements are incorporated systematically.	-5	15	- 45	15	-5	35	15	25	15	-5	-5			
	the company agrees and reviews objectives with individuals and teams.	-9	29	-9	11	11	31	11	11	11	-9	29			
	the company assesses individual performance.	13	13		13	13	27	7	27	27	13	- 53			27
3.b.	the company ensures the involvement and participation of its employees.														
	the company facilitates participation by all employees in the continual improvement of products, services and processes, and in the taking of decisions and initiatives.	35	15	15	5	25	25	5	45	35	5	35			25
	- the company encourages its personnel to make decisions and implement changes within clearly-agreed parameters.	28	28	-8	12	12	12	-8	32	12	12	28			12
	the method used for top-down and bottom-up communication is efficient, and is periodically reviewed in order to introduce new improvements.	33	33	7	7	27	7	27		13	7	13			7

	RESOURCES	1	2	3	4	5	6	7	8	9	10	11	12	13	14
4.a.	the company manages its financial resources:														
	the method used for planning and controlling the principal balance sheet elements (clients, suppliers, fixed assets, capital, indebtedness, etc.) is consistent with the company's strategy.	24	-4	-4	-4	16	-4	16		36	16	- 44			
	the company distributes and utilises financial resources in a manner that supports its objectives for the future.	22	-2	-2	-2	18	-2	18		-2	18	22			
	the company adequately manages financial risks.	11	9	11	11	9	11	9	9	9	9	11			
4.b.	the company manages its information resources:														
	the company's approach to information management ensures that all data on-products, services, processes, clients, suppliers and competitors is easily accessible to and usable by interested parties.		-20	20	-	-	-	20		-20	20	-20			
	the company ensures that all employees are provided with adequate information in order to carry out their work.	16	16	16	4	44	24	24		16	4	36			
	the company ensures the security, accessibility and accuracy of information.	36	4	16	4	24	4	24		16	24	16			
4.c.	the company manages its material resources:														
	the company has a method which enables it continually to improve the control and efficient use of its material resources (fixed assets, buildings, equipment)	18	2	2	2	2	2	2		2	22	18			
	the company has a method which enables it continually to improve the control and efficient use of its suppliers.	18	22	2	2	22	2	2		18	22	38			
4.d.	the company manages the application of technology:														
	the company has a routine system for identifying, evaluating and incorporating new technologies .	29		-9	31	-9	11	11		-9	11	-9			
	the company manages and optimises the use of its intellectual property.	17		17	23	17	3	3		23					

	PROCESSES	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5.a.	the company manages its quality system:														
	the company has a method for managing its quality system, based on ISO26 9000 standards. (If the certificate is not held, a few points can still be allocated).		14	14	-6	14	26	14		14	14	66	14	14	14
5.b.	the company's activities are orientated towards the client:														
	the company has a system for detecting the needs of its clients, and uses the information so obtained to improve its products and services.	11	11	9	9	29	9	29	29	9	9	- 51	- 51		11
	the company actively fosters a close relationship with its clients.	37	17	3	3	23	17	23	23	3	3	37	23		3
5.c.	the processes of manufacturing, or of supplying services, are managed systematically:														
	Processes are supervised by a designated responsible person or owner.	17	17	17	3	3	17	23	23	23	23	37	17		23
	there are defined standards for processes.	2	18	18	2	2	18	22	22	22	22	38	18		22
	Products or services are improved in response to client requirements.	23	23	-3	-3	17	23	17	17	17	-3	23	17		17
	the company ensures regular delivery of its products or services in accordance with the requirements of its clients.	- 40	-	20		20	-20	20	20	20	-	- 60	20		-
5.d.	the company manages the process of continual improvement:														
	the company identifies its key processes.	12		8	8	28	12	8	8	8	8	- 52	12		8
	the company establishes monitoring indicators, and sets objectives.	-8	12	12	12	-8	-8	12		32	-8	- 48	-8		12
	the company uses a consistent method for introducing changes.	-5	25	-5	15	15	15	15		-5	15	- 45	-5		15

	CLIENT SATISFACTION	1	2	3	4	5	6	7	8	9	10	11	12	13	14
6.a.	the company uses direct tools (e.g. surveys) to measure clients satisfaction with its products or services:														
	the company measures the satisfaction of its clients.	-4	-4	- 44	-4	36	16	16	36	16		- 44			24
6.b.	the results of these measurements show a positive trend over the last 3-5 years in terms of:														
	the company's ability to comply with product or service specifications.	-40	-	-20	-	40	20	20		-	20	-40			
	the reliability of products or services.	-10	-10	-10	10	30	10	10		10	-10	-30			
	the punctuality of deliveries.	28	12	-8	12	32	12	12		-8	-8	28			
	Responsiveness.	32	8	32	8	28	8	8		8	8	12			
	the processing of complaints.	-10	-10	-10	10	30	10	10		10	-10	-30			
	the operation of its technical service.	-10	-10	-10	10	10	10	30		-10	10	-30			
	the implementation of guarantees.	16	16		4	4	4	24		4	24	36			
6.c.	the company achieves good indirect results which suggest that clients are satisfied:														
	the company has a low complaint rate.	-9	-9	11	-9	11	-9	31		11	11	49			11
	Clients send large numbers of greetings cards, rewards, or "good supplier" certificates.	16	4	36	24	4	16	24	4	24	24	36			
	the company receives progressively larger orders from its regular clients.	26	-6		14	-6	14	-6	34		14	46			14

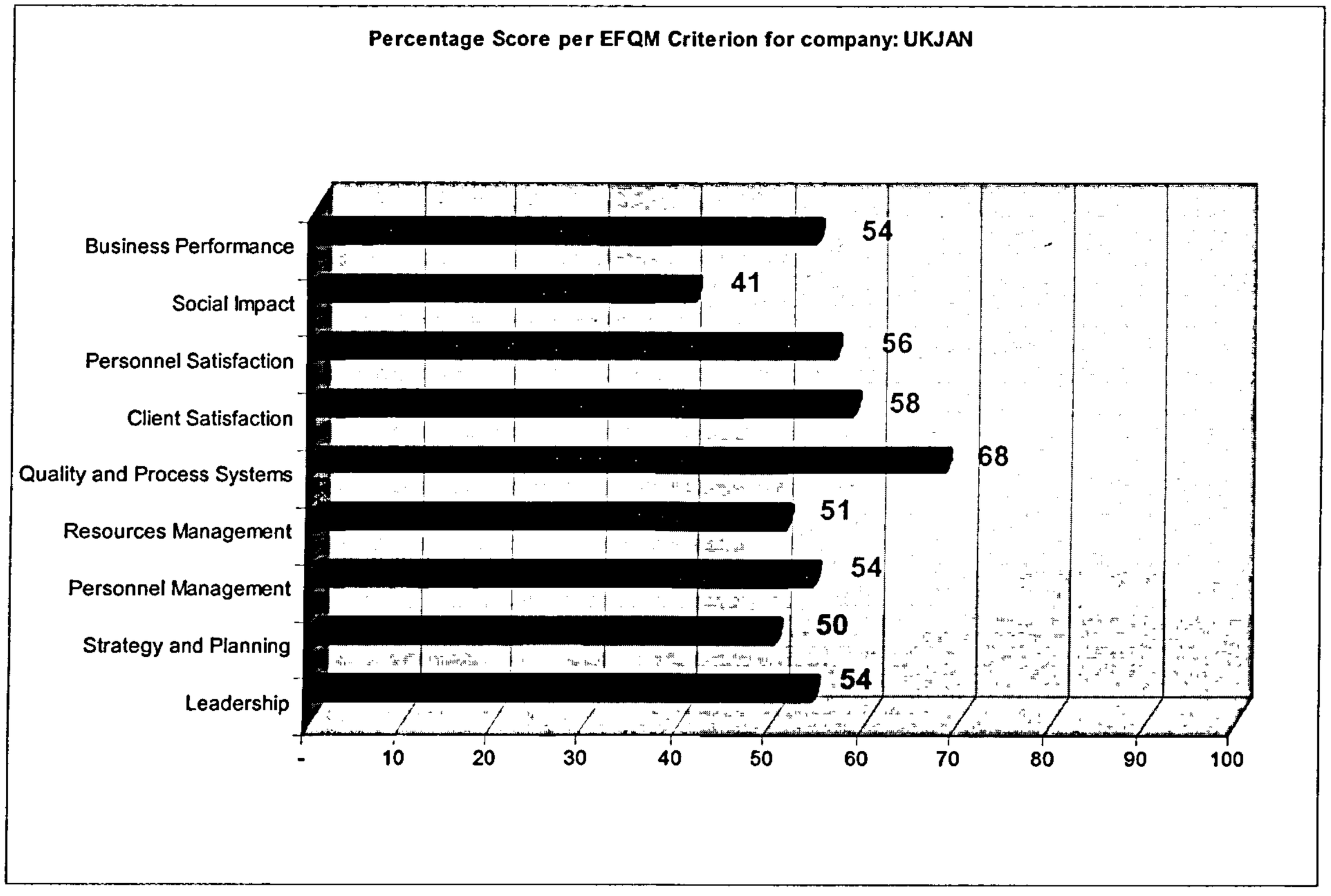
	PEOPLE SATISFACTION	1	2	3	4	5	6	7	8	9	10	11	12	13	14
7.a.	the company uses direct tools (e.g. surveys) to measure the satisfaction of its employees:														
	the company measures the satisfaction of its employees.	-10	-10	-10	10	10	30	30	10	-30	10	-10			-30
7.b.	the results of these measurements show a positive trend over the last 3-5 years in terms of:														
	Satisfaction with the working environment.	31	9	9	9	9	29	29		11	11	31			11
	Health and safety provisions.	5	5	5	5	5	25	15		15	15	15			5
	Internal communication systems.	-	-	-20	-	20	20	20		20	-20	-40			-
	Compensation and examination systems.	5	15	15	5	25	25	25		15	15	35			5
	Profit-sharing systems.	4	4	4	16	24	24	4		4	4	56			4
	the style of management.	42	-2	-2	-2	18	38	18			18	42			-2
	Ongoing training.	16	4	4	16	4	24	4		4	24	36			4
7.c.	the company achieves good indirect results which suggest that employees are satisfied (low rates of absenteeism, staff turnover, accidents, etc.):														
	the company shows low rates of absenteeism.	-2	22	-2	18	-2	18	-2	18	18	-2	- 42			-2
	there is a very low rate of staff turnover.	36	4	16	24	16	24	4			24	36			24
	the accident rate, and the seriousness of the accidents involved, is progressively lower.	-7	13	-7	13	-7	13	13	13		13	47			-7

	IMPACT on SOCIETY	1	2	3	4	5	6	7	8	9	10	11	12	13	14
8.a.	the perceptions of the local community with regard to the company's activities:														
	the company is familiar with the perceptions of the local community with regard to its activities.		-6	14	-6	34	14	34	26	26		-6			26
	the company actively involves itself in various cultural, sporting, social and environmental initiatives.		-4	-4	16	-4	16	-4	-4	-4		-4			-4
8.b.	the company is committed to environmental management:														
	the company takes initiatives to reduce the quantity of waste products and noise levels.	15	5	5	45	5	5	25		15	5	35			35
	the company takes initiatives to prevent health and safety hazards.	-7	13	13	33	13	13	13		-7	-7	27			- 47
	the company takes initiatives to use recycled materials.	22	18	42	22	2	2	2		18	22	38			38
	the company takes initiatives to reduce water and power consumption.	-	-	-	20	20	20	20		- 40	20	-20			-40

BUSINESS PERFORMANCE	1	2	3	4	5	6	7	8	9	10	11	12	13	14
9.a. the economic/financial indicators show a positive long-term trend over the last 3-5 years, and compare well with the company's objectives and with its competitors:														
Sales.	-7		13	-7	13	-7	-7							
Profits.	-7		13	-7	-7	13	-7							
Unit costs.	-7		13	-7	-7	13	-7							
Financial costs.	-10		10	-10	10	10	-10							
Dividends.	-		-	-	-	-	-							

9.b. the indicators of non-financial management (e.g. market share, defect rates, cycle times for principal processes) show a positive long-term trend over the last 3-5 years, and compare well with the company's objectives and with its competitors:														
Market share.	17		17	3	23	3	3							
Defect rates.	-3		-3	-3	17	-3	-3							
Product development times.	-		-20	-	20	-	-							
Order response times.	-3		-3	-3	17	-3	-3							

Percentage Score Graph


Percentage Score per EFQM Criterion for company: UKJAN
Business Performance
Social Impact
Personnel Satisfaction
Client Satisfaction
Quality and Process Systems
Resources Management
Personnel Management
Strategy and Planning
Leadership
54
41
56
58
68
51
54
50
54
-
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20
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70
80
90
100

Appendix H: Benchmarking Stage Report

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CORE

Cranfield UNIVERSITY

ADAPT – CORE

EFQM Benchmarking Report

Confidential Report

Company Name: _____ (1)

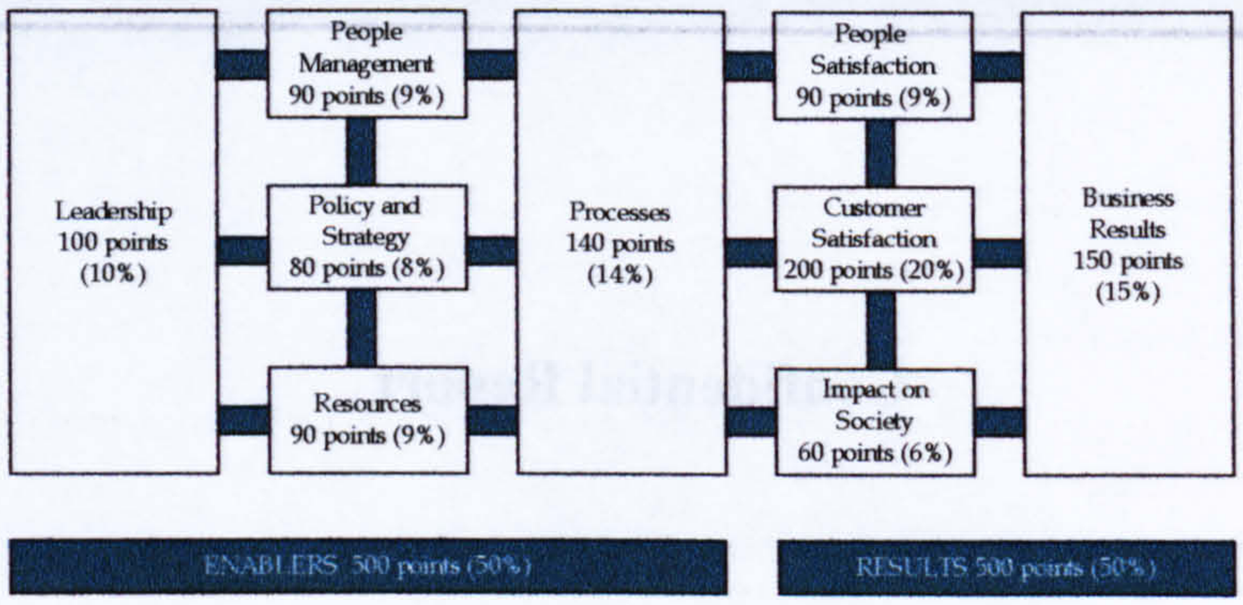
Tuesday 16th June 1998

BENCHMARKING WORKSHOP 16th June 1998

Company: _____ (1)

OBJECTIVE:
This information sheet contains the results obtained from the CORE Benchmarking analysis of the data obtained from _____ (1). Please note that all the information provided is treated confidentially, and is provided to assist you in the Benchmarking process.

The Benchmarking process is based on the widely recognised and employed European Foundation for Quality Management (EFQM) Business Excellence Model, shown below.



SECTION A: Performance Measurement

In this section, you will find the percentage scores, obtained from the data received by _____ (1)

EFQM Model Element	Percentage Score
Leadership	49%
Policy and Strategy	38%
People Management	32%
Resources	63%
Processes	59%
Customer Satisfaction	71%
People Satisfaction	56%
Impact on Society	36%
Business Results	79%

SECTION B: Performance Positioning

The following table indicates the EFQM score attained by _____ [(1)].

Total EFQM Score	---

The average EFQM score for all the participant companies is: 487. This places Hitech above average amongst the participant companies. It must be noted that 582 is above the typical starting EFQM score for an assessed company. The maximum EFQM score on the database was 582 points out of 1000.

The following table shows the average results for the enables and results elements of the model. The Enablers criterion demonstrates the company performance in what they do, and the results indicate how well are they performing in what they do.

Enablers	--%
Results	--%

The average value for the enablers across all participant companies is 45%, while for the results 44%. This places your company above average in the enablers and above average for the results.

The maximum and the minimum score for the enablers were 60% and 27% respectively, while for the results the maximum average value was 61% and the minimum equal to 19%.

The following table positions your company against the maximum, minimum, and average values for each element of the EFQM model.

Specific Company		All Companies		
EFQM Criterion	**Company Score**	**Minimum**	**Average**	**Maximum**
1. Leadership	--%	18%	45%	60%
2. Policy and Strategy	--%	19%	40%	57%
3. People Management	--%	10%	35%	53%
4. Resources	--%	38%	49%	64%
5. Processes	--%	36%	60%	71%
6. Customer Satisfaction	--%	45%	59%	71%
7. People Satisfaction	--%	13%	45%	56%
8. Impact on Society	--%	10%	39%	58%
9. Business Results	--%	16%	49%	79%

Thank you for participating the European Social Fund (ESF) ADAPT CORE Benchmarking Activities. For any comments or remarks, please contact:

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Telephone: +44 (0) 1234 754-073
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(1) Please note that due to confidentiality agreement with all participant enterprises, all references to the enterprise name and the data have been removed.

Appendix I: Focus Group Invitation Letters and Evaluation Questionnaire

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CIM INSTITUTE
CRANFIELD UNIVERSITY

CIM Institute
Address:
Cranfield University,
Bedfordshire,
MK43 0AL,
United Kingdom.

Telephone:
+ 44 (0)1234 754-073
Fax:
+ 44 (0)1234 750-852

To :

_____ (1)

_____ (1)

_____ (1)

Your ref.: Our ref.: **ukhit/ 16-06-98/BP** Cranfield, June 01 1998

FOCUS GROUP MEETING: INVITATION

Dear _____ (1),

I would like to take the opportunity to thank you again for your participation in the CORE Benchmarking and Knowledge Transfer activities, and invite you to take part in the next stage of this process.

I am writing to inform you that on Wednesday the 16th of June, as part of the CORE project activities, we shall be conducting a half-day workshop at the CIM Institute, Cranfield University, and titled "***Successfully Marking the Bench***". The workshop will commence at 13:30. Alternatively you can join other companies, who participated in the CORE export transnational activities, for lunch at about 12:30.

The CORE Benchmarking process involves four stages: Performance Measurement, performance positioning, Knowledge Transfer and finally improvement. Currently «Company» has successfully completed the first stage of the process. The aim of this workshop is to disseminate knowledge and expertise about performance and best practices and hence address the next two elements of the Benchmarking process.

If you wish to participate in the event, please complete the attached form and mail it to the CIM Institute by the 12th of June or send it by fax on: **01234 750-852**. A SAE has been provided for your convenience. The workshop will identify the companies who demonstrate superior performance. If you want your company to remain anonymous, please tick the appropriate box on the form.

I am certainly looking forward to seeing you in the Benchmarking event. Please find enclosed a map with directions to the CIM Institute.

All the best,

Alexandros Skandalakis

Cranfield UNIVERSITY

"Successfully Marking the Bench"

Wednesday 16th June

14:00 – 17:00

Company Name: _____ (1)

Representative(s): 1) _____ (1)

(please add if more than one person) 2) _____ (1)

3) _____ (1)

I **shall** be attending the Workshop ❑

I **shall not** be attending the Workshop ❑

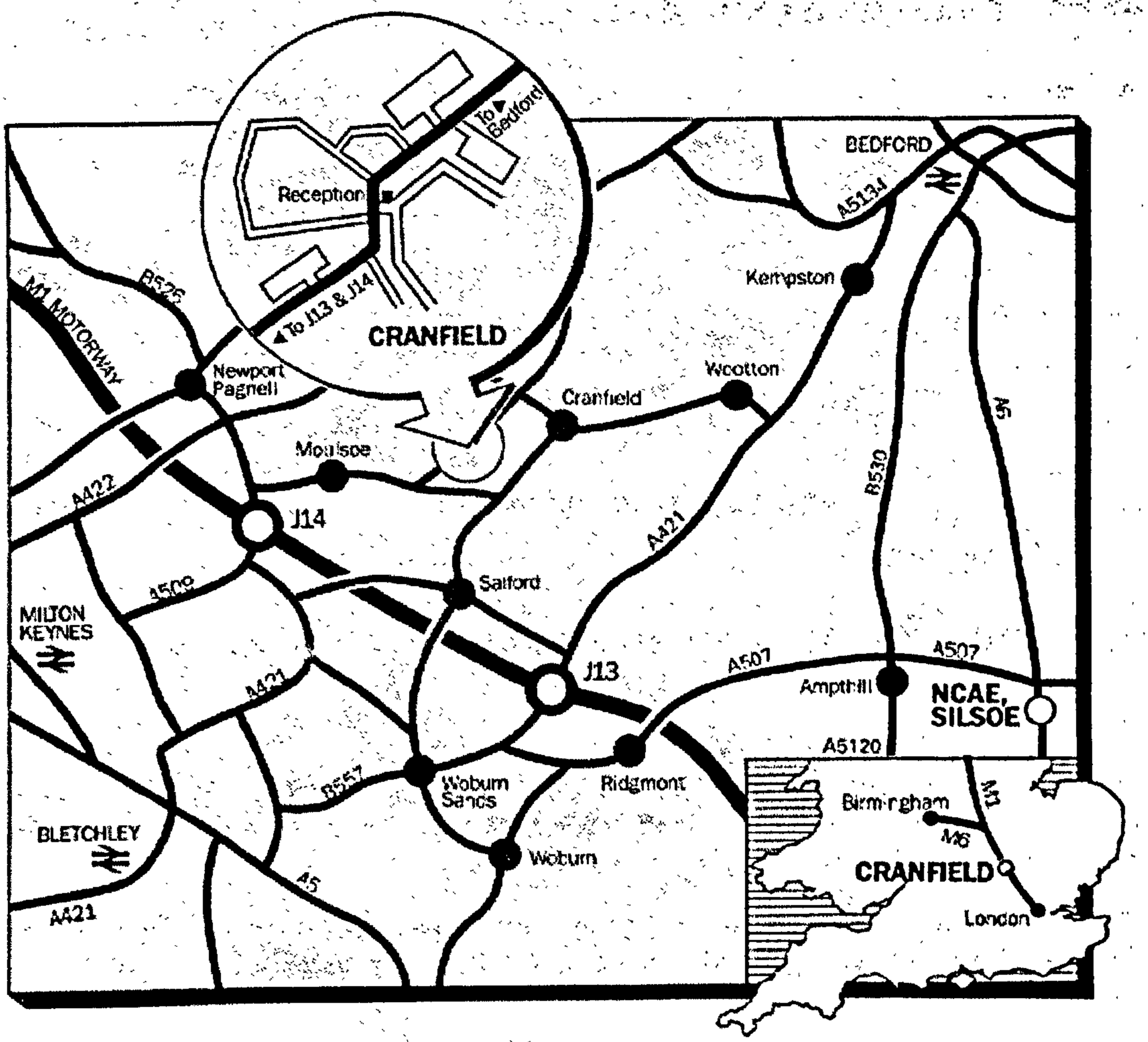
I would like my company to remain **ANOMYNOUS** in the workshop ❑

CORE

Please fill the form and place it in the enclosed SAE, or fax it to Alexandros Skandalakis at **01234 750-852**, by the 12th of June 1998.

(1) Please note that due to confidentiality agreement with all participant enterprises, all references to the enterprise name have been removed from the thesis.

Directions to the CIM Institute, Cranfield University have been provided for your convenience.



The CIM Institute (Building 53) is the glass building opposite the petrol station in Cranfield University.

(1) Please note that due to confidentiality agreement with all participant enterprises, all references to the enterprise name have been removed from the thesis.

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Fax:
+ 44 (0)1234 750-852

To :

_____ (1)
_____ (1)
_____ (1)

Your ref.: Our ref.: **ukhit/ 16-06-98/BP** Cranfield, June 01 1998

FOCUS GROUP MEETING: SUPERIOR PERFORMANCE INFORMAL PRESENTATION

Dear _____ (1),

I would like once again to thank you for participating in the CORE Benchmarking and Knowledge Transfer activities. We highly value your participation in the forthcoming Focus Group event on Tuesday the 16th of June at the CIM Institute, at 14:00.

As Hitech displayed excellence amongst the other participant companies in some areas of the EFQM model, we invite you to conduct an informal talk of five to ten minutes to present how the superior practice was achieved.

The areas that we would like you to talk about are listed below, together with possible questions or areas of interest (these are provided for your assistance and are by no means obligatory to follow).

1) The management team acknowledges the achievements of individuals and teams, how is this achieved, is there a formal methodology?

2) High responsiveness to the customer, how is this done, and what feedback do you take from your customers, how do you ensure you maintain high responsiveness?

Again, let me remind you that this is an introductory and informal talk, and the aim is to disseminate your expertise amongst the participant companies.

I am certainly looking forward to seeing you on Tuesday,

Sincerely yours,

Alexandros Skandalakis

FOCUS GROUP WORKSHOP 16th June 1998
Personal Evaluation Form

OBJECTIVE

This feedback form will enable us to improve the workshop structure, the process followed and the information content. We greatly value your personal comments on today's event.

INSTRUCTIONS

Please indicate your views by encircling the appropriate rating on the 1 to 5 scale.

1. The workshop has provided a good understanding of the Knowledge Transfer Process.

1 2 3 4 5

Disagree **Strongly Agree**

2. How adequately has the presentation communicated the concept of Knowledge Transfer?

1 2 3 4 5

Poorly **Successfully**

3. How do you rate the quality of data and the information provided during this workshop?

1 2 3 4 5

Poor **Excellent**

4. How do you rate the objectivity of the Knowledge Transfer Process?

1 2 3 4 5

Subjective **Objective**

5. Is the attained EFQM score representative of your company performance?

1 2 3 4 5

Disagree **Strongly Agree**

6. How would you rate the potential for improvement through the use of the Knowledge Transfer Framework?

1 2 3 4 5

Low Potential **High Potential**

Thank you,

Alexandros Skandalakis

Company Name:

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